in contrast to ONR's successful decentralized management.

The present system often leads to expertise in the writing of winning proposals rather than in solid technical quality and creativity. As one academic put it, we have promoted "grantmanship." The Government is making the same mistake with universities as it is making with industry when it forces narrow potential military relevance "PMR" criteria on industrial I. R. & D. projects.

This is not to derogate the value of grants from NSF and from the other government foundations. Without them the country's supply of Ph. D.'s in physics, chemistry, biology, and the like, would dry up even more than is now taking place. But we have retreated from the farsighted vision of the ONR period. NASA's university support program of a decade ago was also more effective than today's system; consideration should be given to its reinstitution through increased budgets.

Excellence in academic research and graduate education is the leading edge of the country's innovation process. We are not getting the boldness or quantity we need under today's level and type of university R. & D. procurement.

To try to understand the "ONR phenomenon," some historical accounts have been evaluated and discussions have been held with ONR personnel. This brief study leads to the following tentative conclusions:

1. ONR is clearly an example of successful *direct funding of R. & D.* by a Federal agency.
2. ONR provides in addition an excellent example of successful management of a basic research program; an example which is applicable to industry as well as to government agencies.

The main reasons for ONR's success as a *funding agency* is its relative freedom from elaborate procedures for submitting proposals and its rapid decisionmaking process. These reasons were probably even stronger in the past, because ONR has also become more bureaucratic with age, but ONR still seems to be unique in its ability to appraise proposals and make funding decisions quickly. Another unique feature of ONR is the branch-office system (Boston, Chicago, Pasadena, London, and Tokyo) which provides listening posts with proximity to key contractors. This partly decentralized organization certainly contributes to total effectiveness.

The main historical message of ONR is that it illustrates very good *management of a basic research program.* In trying to understand this fact, one quickly becomes aware that the classical elements of successful basic research management were all present in ONR's history, some of them as a result of straightforward good management. The reasons which stand out are:

1. ONR's management has always had a good understanding of the needs of their customer (the Navy).
2. At the same time, they have been able to maintain a necessary isolation from the everyday operational problems of their customer.
3. They operate with a minimum of bureaucratic constraints.
4. ONR has been managed by competent, confident scientific experts often drawn from academic and industrial institutions for temporary tours of duty.
5. They have an effective review process; thorough, but not too frequent.
6. They also fund and manage successful *applied* research (e.g. towed *SONAR* array technology). This gives ONR a sensitivity to the total R. & D. process which enhances its performance on basic research.

When one examines the output of ONR's program over the last 30 years it is obvious that widely applicable results have emerged (atomic time standards, metallurgy of titanium and molybdenum, long-term freeze preservation of blood, the lithium battery, computer-aided instruction, etc.). The project selection has clearly been very good. The approach of funding enough projects to insure an adequate level of success has also been used very skillfully.

A historical point of interest is that ONR initially was the only Federal funding agency for research. This meant that although the program always reflected the needs of the customer (the Navy), in the initial years it covered a very broad spectrum of scientific disciplines. Over the years, responsibility for some of these scientific disciplines was transferred to new agencies and ONR's range was narrowed. However, project selection today still has high potential of delivering broadly applicable results beyond the specific needs of the Navy.

In summary, ONR represents an impressive example of basic research management. The effective and efficient management of basic research is one of the most difficult challenges in R. & D. management. A study of the ONR example is recommended to any organization facing that challenge.

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b. Conduct, at each of these centers, of research and development of new generic technology in the field of excellence—technology needed by industry to accomplish process or product innovation.

c. Dissemination to, and assistance in utilization by, U.S. industry of such technology, wherever it originates in the world, including economic studies to evaluate potential return on investment from implementation of the generic technology by industry.

d. Planning and policy-type guidance of the research, development, and dissemination programs of each center by an associated working group made up primarily of representatives from interested industry, but with representatives of the university or college and of the Federal Government also participating, and making use of the neutral ground of appropriate engineering societies for organizing and serving as secretariats for these groups.

e. Planning, policy-type guidance and stimulation of the overall Cooperative Technology Centers activity, on a national scale, by a Cooperative Technology Council, under the aegis of the Secretary of Commerce, and again made up primarily of representatives from industry, but with representatives of universities, colleges, and the Federal Government also participating, and making use of the neutral ground of the Engineers Joint Council for organizing and serving as a secretariat for this council.

f. Directed emphasis and priority to be given, in the local and national planning, guidance, and stimulation to research, development, and dissemination activities particularly pertinent to the needs of small companies and trade impacted, technology impacted, regulation impacted, resource impacted, or disaggregated industries.

g. Funding for the centers, and of the overall program, to come jointly from industry and the Federal Government. In particular, the Federal funding should be used:

(1) To initiate the overall program;

(2) As seed money for early, high-risk research and development of new, advanced generic technology;

(3) To help attract industry funding into such research and development programs as early and as fully as possible;

(4) Continually to assist the centers in their process of dissemination and transfer to industry of new generic technology, wherever it originates in the world. Use of the Federal procurement process to stimulate or accelerate such transfer should be included in appropriate cases.

2. Since the Cooperative Technology Centers activity must start small and gradually evolve to cover all fields of generic technology, the field of manufacturing technology, as the area having the greatest potential for economic and social benefit to the Nation, is recommended as a particularly appropriate field in which to initiate such activity. Recommended as an especially appropriate initial focus in this field is the still incipient generic technology of computer integrated manufacturing—harnessing the computer to optimize and automate manufacturing fully from product design through final inspection. This technology is one in which the United States is rapidly falling behind the rest of the world, yet one having by far the greatest potential for economic and social benefit, for increasing employment, and for enhancing the international competiveness of U.S. industry, if properly researched, developed and then utilized. Cooperative Technology Centers (centers of excellence) should be established in this field, developing R. & D. and dissemination programs for such areas as computer aided design (computer graphics), computer optimized production planning, computer optimized production control, computer automated manufacturing equipment and systems, computer controlled in-process inspection and quality assurance, computer automated assembly and robotics.

Here the appropriate engineering society for organizing and serving as secretariat for the working groups associated with these centers would be the Society of Manufacturing Engineers. Appropriate first year Federal funding would be $15 million.

Appropriate future fields of activity, as the program develops, would be the social sciences and the life sciences, particularly as related to research, development, and utilization in industry of new knowledge concerning methodology for capitalizing on the potentialities of the technology of computer integrated manufacturing for increasing quality of working life, health, and safety in industry.

Rationale

Highly effective stimulation of industrial innovation can be accomplished by direct support, by government, of research and development of appropriate, new, generic technology—technology which enables industry to move in new directions in processes and products, but is not, a priori, directed at development of specific, proprietary-type new processes or products. This is so because such new technology, generic to industrial activities, and in the public domain, can then be drawn on by industry as a whole to innovate new, specific, proprietary processes and products.

Accomplishing such stimulation by developing a coordinated network of Cooperative Technology Centers (centers of excellence) in various fields of generic technology, and locating these at universities and colleges, in the manner described in the above recommendation, provides a mechanism having maximum potential for facilitation of innovation in industry. The following factors at work in such a mechanism are particularly significant to that potential:

1. A strong coupling and working relationship between industry, universities and government. This comes about first because of the interaction and coupling of the powerful resources of all three that must take place in the planning, guiding, and stimulation of the generic *research* and *development* to be done in support of innovation in industry. Secondly, it comes about because of the joint roles that government and university resources must play in assisting the *dissemination* or *utilization* of generic advanced technology (wherever it originates in the world) into industry.

2. An increase in the quantity and quality of engineering graduates available to industry. This comes

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laboratory research programs are not being adequately tapped for their innovation potential by the private sector.

Policies to achieve this goal can be expected to:

(1) Increase the utilization of the results of university research by the industrial community thus stimulating the rate of industrial innovation.

(2) Increase the societal relevance of university research by broadening the exposure of its research personnel to the pluralism of society's needs as evidenced through the industrial community as well as by the Federal R. & D. funding agencies.

In considering new initiatives to achieve this policy goal, the panel suggests that the Federal Government carefully consider the risks inherent in any major shifts in the basic motivations of the two principal institutions involved—the universities and the industrial community. It is hoped that the resulting increase in university/industry coupling will be viewed by industry for what it could become; significant opportunity to invest people and material resources in an opportunity that in total will be of significant benefit to employees, customers, shareholders, and society—an opportunity that can compete successfully for resources with other investment opportunities available to the industrial community.

It is also hoped that the resulting increase in university/industry coupling will be viewed by the university community for what it could become; a significant opportunity to broaden the pluralism of the university community's interactions, thus improving its capability to meet society's education and research needs.

For these reasons, the panel recommends that the Federal initiatives be designed primarily to *stimulate* closer coupling of the universities and industry leading over time to a major increase in the funding of university projects by the industrial community.

Policies to achieve this goal should be designed in a way which will assure—

(1) That the final control of, and responsibility for, research undertaken in universities remains clearly in the hands of university researchers. (Interaction with, and support from, industry should provide perspective and insight, not control.) The emphasis should be on *fundamental research*—especially the longer term fundamental research that frequently cannot be justified in the research program of a single company—and generic technologies widely applicable beyond the specific interests of a single company or industry.

(2) That universities retain any patent and publication rights arising from the research.

(3) That small entrepreneurial companies have a substantial opportunity to participate in and benefit from the closer coupling.

Some policies cannot be expected to succeed without enthusiastic cooperation from both the academic and industrial sectors. However, the following Federal policy options can be expected to accelerate the process.

(1) Direct Federal support to university researchers for the purpose of strengthening the dissemination of their research findings to industry. (Such grants could be an "ad-on" to grants for university research being funded by Federal agencies under existing programs or could be made independently.) Some Federal R. & D. grants already contain such provisions.

(2) Direct Federal funding of universities for research aimed at better understanding and defining the needs of the industrial community.

(3) Direct Federal support to universities for the purpose of organizing industrial consortia with the objective of providing ongoing dialogue and research grants from the industrial community.

(4) Direct Federal funding of matching grants to stimulate the university desire to carry out industry funded research whether originated by the university itself or suggested by industry. The size of the matching grants would be derived on a formula basis from the size of the industry funding and would be used for research projects selected by the university in the general area of technical interest represented by the industrially funded project.

The matching funds should reflect the size of the company funding the research. Small company projects would stimulate larger grants matching funds.

(5) Initial incentives to industry, to encourage their involvement in closer coupling with the universities. They are also intended to forestall any tendency to reduce internal industrial R. & D. The incentives could be in the form of special tax credits or grants to cover a portion of the industry funds spent in universities (industry funds spent for contract research, where industry retains proprietary rights, would not qualify for these incentives). The need for these incentives is expected to diminish once the value of the program becomes fully apparent to industry.

It is believed that encouragement and leadership from the Federal Government could play a key role in ensuring both university and industry commitment to this program. The President could usefully charge both industry and the universities to take a more proactive role in their interactions with each other in the research area.

Specific mechanisms for encouragement of increased interactions involving Federal laboratories were not discussed by the panel. However, it was noted that both NASA and particularly the Department of Agriculture have, with varying degrees of success, conducted vigorous programs to help industry utilize technology developed in their laboratories. A study of these efforts should provide the basis for the development of the necessary mechanisms.

Long term, these policies can be expected to increase substantially the effectiveness of the research, development, and innovation in both the private and public sectors.

Additional benefits to be derived from such a program are:

- To provide "seed money" for fundamental research studies of a longer range nature that cannot be included in most industrial research programs.

(3) That small entrepreneurial companies have a substantial opportunity to participate in and benefit from the closer coupling.

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ADVISORY COMMITTEE ON FEDERAL POLICY ON INDUSTRIAL INNOVATION

Advisory Subcommittee on Procurement and Direct Support of Research and Development

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Federal Trade Commission to allow it to better carry out its quasi-adjudicatory functions.

Last and most important, the cost of patent protection in our litigious society probably cannot be slashed enough to make it affordable to individuals and very small businesses. The Government must provide a pool of sophisticated legal aid for those who cannot afford to protect themselves from patent infringement.

GOVERNMENT FUNDED RESEARCH

The Industry Subcommittee has recommended that the patent rights on the results of government-sponsored research be transferred to the private sector for commercialization. The Public Interest Subcommittee is vehemently opposed to this recommendation.

At present, there is no uniform policy on government-sponsored research. Federal agencies have greatly varied policies with regard to taking title under research and development contracts with private organizations. These policies range from giving the commercial rights to a research firm to taking title on behalf of the public to all inventions that result from the research.

Last year public taxpayers spent about $30 billion on research and development. Most of this was performed under a range of contracts by private industry. Congressional testimony indicates an increasing tendency for the Government to give away patent rights in government-financed research. That testimony over the past 3 years also suggests that the present system has accelerated the process of industrial concentration, has reduced the taxpayers' knowledge of the results of research, and raised serious questions as to the benefits society gets for its dollars.

The Public Interest Subcommittee maintains that all taxpayer-funded research should be the sole property of Government. When patent rights are given away, it seems primarily to be the contractor and not the public who benefits. We wonder how many private industry patents today are, in fact, patents developed with government funds but the Government has not been told about them? In many instances, contractors simply have gone ahead and patented products developed with government funds and did not disclose that fact until forced to do so by investigation by Congress.

A certification requirement, with criminal sanctions, would be a first step to deter the private use of patents developed under government contracts.

REGULATORY DELAY

Another recommendation of the Industry Subcommittee—albeit not a unanimous one—was that the patent term should be extended to compensate for delays in commercialization caused by government regulation.

One is tempted to ask, conversely, whether the patent term should be shortened when large companies buy up patents of inventions of potential benefit to society, and then decline to develop or produce on the basis of those patents because they are protecting their competing technology or monopolies. What does industry propose to those kinds of delays that harm public interest and how can those products or services be broken loose?

When we speak of regulatory delay, we certainly need to look not only at government, but industry as well. When industry fights compliance of regulations for patented products, asks for repeated delays because there is a hint that the approval process might go against them, not only the public loses but the ancillary firms that might participate in the earlier production of new and useful products also lose in our economy.

The Public Interest Subcommittee envisions a substantial increase in governmental expenditures if the patent period does not begin until after regulatory approval. At least now, when industry fights compliance, obfuscates testing, delivers truckloads of documentation, or asks for repeated delays, it as well as the people have something to lose. If the patent period did not begin until after regulatory approval, innovation might be slowed by endless haggling.

RIGHTS OF THE INVENTOR

One concern of the Public Interest Subcommittee is the rights of employed inventors. The inventions made by the employees of America's corporations nearly always belong to the corporations; it is virtually unheard of in this country to grant an employed inventor any type of right or royalty in his or her invention. A survey discussed at a recent Industrial Relations Institute meeting indicated that some companies offer small, monetary awards and very few others more substantial monetary awards, but none any continuing right. This is not the case in Germany, for example, where an employed inventor must be compensated in relation to the future value the invention has to the employer.

For the last several sessions of Congress, Representative Moss of California has introduced a bill guaranteeing the rights of employed inventors based on the German model. In essense, it requires negotiation between the employer and the employee on the proper compensation based on the value of the invention, with referral to arbitration if agreement cannot be reached.

The Industry Subcommittee opposes this bill. The Public Interest Subcommittee, on the other hand, finds great merit in such an idea. Hearings have never been held on this controversial measure. As a first step, we advocate hearings held either by Congress or by the Commerce Department with public interest participation, to determine the extent of both the inequity of the present situation as perceived by inventors and its possible effect on innovation.

CONCLUSION

The Public Interest Subcommittee contends that improvement of the system is not a matter of tinkering, but of wholesale reform. Testimony before the Congress in 1968, 1973, 1975, 1977, and 1978 has reinforced this view and made one point. The patent law

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CONCLUSION

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If foreign experience is a guide, there will be many oppositions filed: some pro forma, involving patents that may ultimately have no commercial value (thus imposing a useless burden on the Patent Office); others in situations where it may be clear from the beginning that commercial utility is present, and where many oppositions are filed by actual and potential competitors. In either case, many applicants, particularly independent inventors and small business concerns, will be put to great expense, perhaps before they even have a patent, before they know whether a patent will have any commercial utility, and certainly before they have realized any substantial income. If the prospect of these financial burdens should discourage utilization of the patent procedures, we doubt their advisability.

On the issue of financial hardship, and its impact on independent inventors and small business concerns, we believe it is relevant to note that with respect to the payment of maintenance fees, S. 23 (sec. 41) recognizes the existence of possible hardship. This section permits a deferment of the payment of maintenance fees, if the benefits received by the patentee at the time the fees are due were less in value than the amount of the fees. By comparison, these fees would be small measured against the expense to an independent inventor or a small business concern in the event oppositions should be filed. At that time, of course, it is probable that very little, if anything, would have been realized from the invention; and it would not be known whether anything will ever be realized. Thus, S. 23 (sec. 41) recognizes the existence of possible financial hardship with respect to maintenance fees, but at the same time, would permit imposition of even greater hardship by inter partes opposition proceedings. S. 1308 would, of course, permit the imposition of such hardship even before a patent has issued.

D. It seems to us, also, that the public disclosure of the claimed invention before the patent issues, which is a necessary part of preissuance opposition proceedings, could greatly prejudice independent inventors and small business concerns. Public disclosure prior to patent issuance enables the public to practice the disclosed but unpatented invention subject only to the possible later payment of reasonable damages. Thus, a small company may be faced with competition from a large rival before he has even established a commercial position. Moreover, as the interim rights provisions of S. 1308 (sec. 273) recognize, the large rival could produce and stockpile a product covered by the invention, with the knowledge that sale of the product after patent issue would require him only to pay damages "in the form of royalties reasonable in the circumstances." Not only is this tantamount to a form of involuntary licensing; but it would also reduce the value of the invention to a prospective licensee of the patentee who, for a certain period of time, would be faced by competition from the stockpiled product. This could have particular impact on independent inventors.

E. In contrast to the burdens and expense that would be imposed by the inter partes opposition procedures, we believe that postissuance reexamination procedures would provide a reasonable alternative to lengthy and costly patent infringement suits. These procedures would permit a reexamination *at any time during the life of the patent.* Thus, an opportunity is provided to resolve the matter in the Patent Office, perhaps by canceling, limiting, or narrowing the claims of the patent, and during the proceedings any action filed in the courts could be stayed. Moreover, the procedures appear to be applicable to all patents, including those now in existence, without time limitation. A threatened company might utilize the procedures to test the patent. If unsuccessful, his position would not have been substantially altered. Frequently, the only recourse a defendant has who is sued for patent infringement is to capitulate or to engage in expensive time-consuming litigation. As Judge Hand observed in *Cleveland Trust Co.* v. *Osber & Reiss*, 109 F. 2d 917, 922 (CA 1940) ". . . it is often less troublesome to buy one's peace from a possessor of many patents, than to enter into a long-drawn and expensive litigation." Under the post-issuance reexamination procedure, an opportunity may be provided to avoid unnecessary capitulation, and also expensive litigation. This should be helpful to all, particularly smaller companies; an authoritative ruling on prior art could be obtained quickly.

The opportunities provided under postissuance reexamination procedures for a more speedy resolution of patent controversies could also have tremendous competitive significance for customers and distributors of an alleged infringer. It is not unusual for a customer of an alleged infringer to become concerned about his own status and liability, since under the patent statute, he, as a seller of an alleged infringing product, is liable to suit. He is frequently left swinging in the wind. There are undoubtedly instances where customers or distributors of an alleged infringer have discontinued handling products because of the fears indicated above. It is in the interest of competition to resolve a problem of this sort as quickly as possible. The postissuance examination procedure could be a valuable step in accomplishing this objective.

F. We believe, further, that postissuance reexamination would improve the competitive system by encouraging and permitting the use of more meaningful prior art at a time when the commercial significance of an invention is more readily discernible. If the patent system is to be strengthened by a new bill, and citation of prior art in a meaningful manner is considered desirable in terms of the objectives of the bill, then it follows that prior art should be cited at a time when most of it is available, and when there is real financial incentive to encourage a thorough search. This thought has particular significance for small business concerns which, as we have previously suggested, may not avail themselves extensively of the opposition proceedings when commercial significance is unknown. On the other hand, when the chips are down financially, as would more likely be the case at the time of postissuance reexamination, it is reasonable to assume that better results will be obtained and greater use will be made of the opportunity to cite prior art.

A principal problem, as we see it, relates to pertinent prior art found or brought forth between the time the patent has issued and the time it becomes commercially important. Postissuance procedures that permit the

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and custom be evaluated from the point of view of benefit to society. My general experience is that the marketplace does a better job of maximizing benefits and apportioning reward than does a more centrally managed system and so I urge the thorough evaluation of the benefits of greater use of exclusive licensing and a greater recognition of the rights of inventors in their inventions. I feel that there must exist solutions which will provide greater benefits for society, for industry, and for the inventors themselves.

APPENDIX H

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June 17, 1975

COMPETITIVE ADVANTAGES OF POSTISSUANCE REEXAMINATION PROCEDURES OF S. 214 VERSUS PREISSUANCE AND INTER PARTES OPPOSITION PROCEDURES OF S. 1308 AND S. 23

I

After many years of hearings and consideration, the Senate Judiciary Subcommittee on Patents, Trademarks and Copyrights will shortly markup a Patent Reform Act. The major objective is to improve the quality of patents and the patent system. The constitutional objective of promoting the progress of science and the useful arts is, of course, still the major consideration. This objective, of necessity, also requires that consideration be given to competitive factors. Stated simply, where patents granted actually disclose new and patentable inventions which are valuable additions to America's storehouse of useful knowledge, the public receives a *quid pro quo* for the temporary monopoly given to the inventor. On the other hand, if the alleged invention upon which a patent is founded makes no such contribution, the effect of the grant is a restraint upon the public generally without the compensating benefit to the public contemplated by the framers of the patent system. Moreover, in the latter situation, the invalid patent may have a severe adverse impact upon the competitive system and the patentee's competitors and customers.

Under present law and procedure, unless and until an interference is declared, the processing of a patent application is a confidential proceeding involving only the Patent Office and the applicant's counsel. All too often, the Patent Office, acting on less than all of the prior art, grants a patent which carries a presumption of validity. When the patentee undertakes to enforce the patent by instituting an infringement proceeding, the defendant, compelled to act in his own self-interest, expends time and money in ferreting out prior art which, upon being presented to the court, may result in a holding of patent invalidity. Thus, the efforts of the patentee come to naught, a monopoly has been asserted without justification, the litigants have been put to considerable amount of expense in terms of money and executives' time, and a great deal of judicial energy and time has been wasted.

Various proposals for establishing procedures whereby prior art may be brought to the attention of the Patent Office have been made. One approach, which may be referred to as the preissuance inter partes procedure, is set forth in §135 of the Scott Bill (S. 1308). A second approach, incorporated in sec. 135 of the McClellan Bill (S. 23), also provides for inter partes opposition after the issuance of a patent, but within a specified time limitation. A third approach, which is incorporated in chapter 31 of Senator Fong's Bill (S. 214), is referred to as the postissuance reexamination procedure. This is not an inter partes proceeding, but would allow any person *at any time within the period of enforceability* of a patent, with no time limitation, to cite prior

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set forth in §135 of the Scott Bill (S. 1308). A second approach, incorporated in sec. 135 of the McClellan Bill (S. 23), also provides for inter partes opposition after the issuance of a patent, but within a specified time limitation. A third approach, which is incorporated in chapter 31 of Senator Fong's Bill (S. 214), is referred to as the postissuance reexamination procedure. This is not an inter partes proceeding, but would allow any person *at any time within the period of enforceability* of a patent, with no time limitation, to cite prior

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concerned narrowly with nuclear weapons through devices for automobile carburetors and braking systems, to prospecting for oil and minerals, to advanced communications and computer concepts, to space propulsion systems of various kinds, improvements in sound-on-film movies, a washer for mussels (shellfish), and so on.

In addition to this background as an inventor, I have been involved since 1950 in a consulting capacity to the U.S. Government or its contractors, and since 1952 as an employee in the Research Division of the IBM Corporation, where I have served as Director of Applied Research, and for a time as a member of the Corporate Technical Committee. I am also a member of the Research Advisory Board of the Committee for Economic Development, and have had a considerable concern for the health of the U.S. economy and for the standard of living of the peoples of the world, especially of the United States. Thus I have seen the process of invention and its impact from many viewpoints.

By now you have no doubt heard many times the general economist's view that 50 percent of the advance in the standard of living in the United States in recent decades has been due to the influence of science and technology, the rest arising from provision of capital, education, and the like. My concern is with the more efficient management of this scientific and technological sparkplug, improving the quality of our choice among technical options, and increasing the amount of quality invention and technology from which to choose.

My testimony of April 26, 1978, to the Senate Commerce Committee (attached) is concerned primarily with the Research and Development process, of which invention is only a small part, but I do emphasize in figures 1 and 2 that *invention* and not research is the origin of some advances or provides the key to the solution of some problems—a point too often ignored by those who write about or manage enterprises.

Now for the role of the inventor. One often hears that the time of the individual (garage or attic) inventor is past—that invention and innovation come now largely from team efforts of large corporations. I could hardly deny the importance and effectiveness of well-run technologically advanced industry in inventing, developing, and fielding important inventions and systems. I do believe, however, that even such organizations tend to underestimate the importance of a special class of inventors, whether employed by such organizations or quite independent of them. These are individuals of generally broad experience who have not lost a certain degree of naive ingenuity, and who have at the same time an analytical and self-critical faculty. About such people I can only say what is reputed to have been advocated as to how to treat a specimen of a cross between a canary and a crocodile: "I don't know, but when it chirps, you had better pay attention." Three such people whom I know well are Luis W. Alvarez, James G. Baker, David E. Sunstein. Their inventions cannot be confined to a narrow field; society will therefore benefit most if the inventive product of these rare individuals is properly protected by the patent system and commercialized. What stands in the way?

FOR THE INDEPENDENT INVENTOR, probably the greatest bar is a certain lack of competition in segments of U.S. (and especially world) industry. This is particularly frustrating in the automotive field.

There are, of course, "people problems" in commercializing inventions by selling the patents or rights under the patents. In many organizations contact with the outside inventor is through technical people within the company who have a "not invented here" attitude. This is a common inhibition on the application of inventions developed within the company as well, and is a severe problem for management. One might think that the normal business goal of maximizing profit would lead to incentives such as an award or bonus for an individual who identifies an invention or innovation in the outside world or in another division of a large corporation and manages to bring it into his or her own division, but such incentives seem rare. Such positions seem rare, too.

Another inhibition to society's receiving maximum benefit from the individual inventor is a lack of contact with important problems. My own experience shows that any of the outstanding individuals whom I have mentioned simply cannot help inventing reasonable and numerous solutions when presented with a problem. I know equally intelligent and experienced people who have never invented anything although they contribute in other ways.

THE INVENTOR EMPLOYED IN INDUSTRY has different problems, and I suppose that is more directly the concern of the present Committee. Often the inventor is rather narrowly constrained to work within the field of interest of the company and in fact on specific products. In many cases, more freedom for the inventor will result not only in more inventions altogether but even in more inventions in the field sought. That applies to the experienced inventor.

I believe that far more individuals are capable of invention but that they should be rewarded for good inventions, not only for those which make it successfully to the marketplace. Too often, in my experience, rewards go to the team within a corporation which put a product into the marketplace, without recognition of the important role played by other internal competitors who make nearly as good and inventive a product candidate, which then sets a standard which is surpassed by the product finally fielded. The commercial success of the product and thus the scale or fact of rewards are often entirely out of the hands of the inventor. He need not be rewarded for *every* good invention, but rewards should be sufficiently likely to serve as a stimulus not only to inventors in the field but to others to begin to exercise that combination of talent and experience. "Recognition" is nice, but material incentives are more widely used for corporate officers; they might work for inventors too. Of course, the inventor must realize that the invention itself does not ensure commercial success—that rare talents and efforts in development, management, sales, and the like are also necessary and must be paid for, so that the inventor's share or royalty may properly be only a few percent of cost or price of the item containing the invention.

people I can only say what is reputed to have been advocated as to how to treat a specimen of a cross between a canary and a crocodile: "I don't know, but when it chirps, you had better pay attention." Three such people whom I know well are Luis W. Alvarez, James G. Baker, David E. Sunstein. Their inventions cannot be confined to a narrow field; society will therefore benefit most if the inventive product of these rare individuals is properly protected by the patent system and commercialized. What stands in the way?

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employment situation, two engineers, given the same assignment with the same program goals and objectives can behave in different ways. One engineer will solve the problem adequately with known technology; and the other will find a better solution for the problem through his creative talent—and an invention is born. In both cases, the individuals were not "hired to invent" and were receiving the same remuneration for their activities.[3]

In a study done for the 87th Congress, Subcommittee on Patents, Trademarks and Copyrights, of the Committee on the Judiciary, the merits of common corporate practice were questioned in conjunction with the position experienced by employed inventors in Europe.

> "The corporations themselves, in pressing for the policy of the Government, leaving with the research contractor the patents that stem from government-financed research, vigorously contend that money compensation alone is not sufficient to bring forth the best efforts of the researchers and that they (the corporation) should receive patent rewards as well. Assuming without conceding that this be true in the case of government research contracts, corporations have not made it clear why it should be any less true in the case of their own employee contracts."

The incentives granted to employed inventors vary from $1 granted at the time of patent application to cash awards for accepted disclosures, and subsequent patents issued. Some employers grant the employed inventor a "piece of the action" by giving him a percentage of royalties derived from licensing others to practice the patent.

Some industrialists have argued that it is unfair to grant special recognition to inventors when there are others in their firms who also apply creative talent for the good of the enterprise and who do not receive special awards and recognition. Concern has been expressed that if employed inventors are granted special recognition, an air of uncooperativeness will develop among the "technical team." In a letter to the editor of Chemical Engineering News,[4] Dr. George H. Hitchings, Vice President, Burroughs Welcome and Company, said:

> . . . industry has tried all sorts of formulas for patent pools, in which royalties were set aside for the benefit of the inventors—all of those (incentives) proposed now and many more besides. The downfall with such schemes has been the internal dissensions they create. It is often difficult enough to adjudicate the authorship of scientific papers where a spectrum of greater and lesser contributions by a number of individuals is involved.

The possibility of creating possessiveness in intellectual property when incentives are given to individuals for their disclosures, may be a consideration. However, the free enterprise system has thrived on competition as a technique for increasing creativity and productivity. Members of sales staffs are granted incentives through commissions and bonuses. Members of the managerial staff receive bonuses which are related to their "productivity." In production facilities, some individuals work for "piece rates" or are granted incentive bonuses associated with productivity. Both individual and group incentives have proven to be successful in stimulating extra performance and are identified in text books on modern industrial psychology. Additional incentives to inventors will produce increased disclosure.

Employers say that employed inventors have adequate incentive through potential promotion and salary adjustment. However, advancement and recognition are not always automatic for the creative individual. Advancement (promotion) usually infers an increase in supervisory responsibilities. However, the inventor may not necessarily possess the managerial skills required to assume a supervisory position. Salary increases are often coupled to standing industrial relations policies that neglect to relate the true value of inventiveness to the goals and objectives of the enterprise. Finally, patent incentive awards rarely are based upon the worth of the invention.

In a study conducted by Albert S. Davis, Jr.,[5] the following was reported:

> When the Patents, Trademark and Copyright Foundation questioned a carefully selected sample of productive corporate-employed inventors in 1962 to learn whether they would be stimulated to produce more inventions, by far the largest proportion of those replying said they could, and that cash payments, bonuses, and royalties on a percentage basis were the way to do it.

Admiral Rickover addressed the Subcommittee on Patents, Trademarks and Copyrights in the 87th Congress and tied employed inventors' incentives to the intent of the Constitution:

> ". . . one of the two major problems facing the patent system is how to increase incentives for employed inventors who get no benefit whatever out of the patent system as it has evolved. We might well consider whether we ought not to go back to the original intent of the Constitution and devise some reward for inventors whether they are government or industry employees."

Would increased incentives cause an increase in disclosures? Yes, and this can be seen from a brief survey of the experience at the University of California. Prior to July 1963, the University did not require preassignment of patents, but there was a small percentage of the royalties given for inventions disclosed. A change was instituted which resulted in a five-fold increase in disclosure rate. As reported in December 1967 by the Patent Department of the University:

> Under the new policy, the assignment of inventions is mandatory on request and the inventor receives one-half of the net royalties.
>
> This change has had a dramatic impact on the number of inventions voluntarily disclosed by University staff and faculty.
>
> These figures, we believe, demonstrate the value of a policy with a built-in incentive to the inventor.

[3] Robert J. Kuntz, The Inventor's Incentive to Disclose in the Corporate Enterprise System, APLA Quarterly Journal, May 1973, p. 84.

[4] Chemical and Engineering News, June 15, 1970, p. 6.

[5] Albert S. Davis, "A Piece of the Action," International Science and Technology, p. 50 (December 1963).

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CPDC was created through Public Act 248 giving it the right to provide funds for product development out of state bond sales revenues. Constitutionality (the question being use of public funds for private ends) was established in the State Supreme Court. The mechanism is in place, ready for scaling up under nationalized sponsorship.

It should be recognized that a product development corporation supports innovations that could not attract capital from conventional financial sources. It is fair to conclude that the U.K. innovations which now provide a royalty stream of $40 million per year would not have been sponsored at all.

Another important facet of a product development corporation is its insistence on partial project support by the innovator (usually 40 percent of total development cost). Beyond the technical evaluation of the product development corporation staff and directors, the requirement for investment to prove conviction is a key element in improving statistical likelihood of success.

The NRDC and CPDC experiences have been exhaustively documented. Attached are:

1. Latest NRDC Annual Report.
2. Original proposal for CPDC.
3. CPDC enabling legislature, Public Act 248.
4. Update of CPDC history.
5. Summary of CPDC authorized projects.

Recommendation:

That the product development corporation concept be expanded under national sponsorship.

CONNECTICUT PRODUCT DEVELOPMENT CORPORATION

111 Lafayette Street - Hartford, Connecticut 06106 - Tel. (203) 566-2920

SUMMARY OF CPDC ACTIVITIES TO OCTOBER 30TH, 1978

1. At October 30th, 1978, CPDC had committed a total of $1,163,140 to the development of new products by companies doing business in Connecticut. This represented 60 percent of the estimated total development costs.

2. By the same date $821,656 had actually been spent, and out of the 19 projects approved for funding by the Board of Directors, 13 had by then completed the relevant development program.

3. Although it is too early to predict whether CPDC will achieve the success ratio demonstrated by the British National Research Development Corporation, results to date are very encouraging as the attached project summaries will indicate.

4. The early history of royalty collection is as follows:

Calendar Year	
1975	$126.70
1976	759.96
1977	2,260.63
1978 (to date)	10,232.16

While the gross amount collected to date may not be impressive, the trend is in keeping with expectations, and some projects appear to have the capability of producing very significant returns in the future. To date 6 of the 13 completed programs have resulted in some royalty payments to CPDC, while others are approaching their initial sales which will in turn produce further royalties.

Step 1 would be to regionalize the embryo CPDC into a New England Product Development Corporation. In due course, other areas offering high innovation potential would also be supported by regional product development corporations.

Connecticut has committed $10 million to CPDC. It is suggested that other New England States be offered the opportunity to join as investors with commitments proportional to industrial activity.

The U.S. Government would concurrently commit funding on a matching basis. This would provide a base of about $80 million (note that with 40 percent matching funds from innovators, the total development fund available would be $133 million).

The funding by all parties would be made available as needed by development projects authorized by the New England Product Development Corporation Board of Directors. The total cash flow outgo would peak in 6 or 7 years and then be recaptured through royalty revenue growth (see NRDC record and CPDC projection).

National support of product development on a commercially sound basis, as can be done through a product development corporation, is a long time base activity, but, it could be a powerful, continuing stimulant to innovation. It's nice that this conclusion is supported by field experience and not just by theory.

Appendix F provided by Mr. J. F. Engelberger, Danbury, Conn. 06810.

APPENDIX G

Implications of a Federal Law Providing Employed Inventor Awards

The implications of the inventor compensation proposals for modern industrial research as it is practiced in the United States are quite clear. The results will be adverse to the national interests. A source of strength—the American spirit of teamwork applied to solving complex technological problems—will be needlessly wasted.

Invention, as used in the patent laws, is a legal term. As outlined in appendix A, invention is only one of the

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they are going to go out and discover. The suit didn't come up overnight. Plaintiff's lawyer has already checked the defendant's product. He has studied all the prior art; he has studied every angle for months before the case was ever filed. On the other hand, the defense lawyer has also studied all the prior art. He has gone into the patent claims with a fine tooth comb, and he has advised his client to go ahead and make the product of the invention. Nine times out of ten, the parties and the attorneys will have been talking back and forth for months, even before the complaint was prepared. They know a great deal about the facts and about each other already. There is great room for stipulation, but you must sit them down and encourage them to do it.

Have both sides put in their *pre*trial briefs the proposed findings and conclusions they want you to make at the end of trial. Put it in right at the beginning. It will give you a road map to follow and enable you to see which way they are going. They can always amend, of course, if they find something new on discovery or at trial.

Demand pretrial summaries of expert testimony. There is no reason why that can't be done. Hold informal conferences, as many as necessary, in your chambers, prior to trial, with all the experts and counsel. No formality; just sit around and have coffee and a smoke and talk over the technology and the law involved in the case. No cross examination—no argument—just back and forth. Like a talk show on television. It will enable you to get enmeshed into the technology and the law. Ask, "What do you mean by that technical term?" "What do you mean by the doctrine of equivalents?" Whoever answers does so with the other guy sitting right there, so if he mis-states it, he is going to be picked up on it. I know you don't have much time for that sort of thing, but if you do it, it can be a net time saving.

The "simplify" requirement can be met by breaking down the technology. It is not necessary to know all chemistry to try a chemical patent case. Only a tiny portion of all chemical knowledge needs to be known, and even that can be again broken down into segments, so that you can understand it. Simplification can be achieved, also, by analogy. For example, in an electrical case it may be possible to visualize wires as pipes, thermostats as valves, and the flow of electrical energy as the flow of water, if that will help you. The key to handling technological issues in a court case is not "expertise" in any one field, such as chemistry or electronics or mechanics. It is simply an ability or affinity for learning technological facts and their relationship to the law to be applied. Technology has nothing to fear from the judge whose mind is willing to let it in.

When you come to considering the invention itself, ask what I call the "what" questions. What was the problem? What was the invention? What did the invention do to what? Then ask the same questions when you come to the prior art references the defendant is relying on. What was the problem solved by that inventor? What was that invention? What did that invention do to what? And so on. If you answer all the "what" questions, whether or not you know very much of the broad technology, I think you will have a very clear picture of the relationship between those prior art patents and what the inventor of the patent before you did.

Next on your agenda, demand an agreed glossary of terms—technical terms and patent law terms—in plain English. There is no reason why counsel shouldn't supply it. If they are going to use those terms in your courtroom, they owe a duty, in my view, to give you a glossary so when they say one of those words or a witness does, you can look at your glossary and say, "What he really means is a valve," or whatever.

On the logistics management problem, announce early that you are not going to put up with a single unnecessary exhibit or deposition. You can insist that both sides streamline their proof. Tell them patent cases are hard enough without jamming the courtroom full of excess stuff.

Next, patent lawyers are reported to be avid seekers of summary judgment, more so than in any other field. As a part of the over-use of pretrial tools, one side files a motion for summary judgment and the other rushes in with a counter motion. When asked "Why?," some say, "To educate the judge." "It gets his attention early." Well, of course, if you are already demanding that they educate you, they shouldn't have to do this. I think if you announce at the pretrial conference that you will not tolerate a summary judgment motion if there's the slightest issue of fact, you might scare off ill-founded motions for summary judgment.

The largest single lawyer problem is the abuse of the discovery process—a horrible waste of judicial time. My pen-pal judges tell me that because many patent lawyers try to win during the discovery period, there are more court battles on discovery motions in patent cases than in all other cases combined! This is one of the reasons for the shotgun pleadings problem. Shotgun pleadings are viewed as laying the basis for widespread discovery. And, frankly, gentlemen, the courts have provided authority for almost any position on any discovery question. So the lawyer is led to say, "It is my duty to protect the client." The cure for dragnet discovery and for resistance to all discovery, is to insist that the lawyers sit together and agree as much as possible. They can do it better than you can. As I indicated a moment ago, most of the time they have already delved deep into the case. Leave the court out of it. One judge appoints a special master on discovery disputes. Another judge wrote me that he happens to have a magistrate in his district who is a trained engineer, and he dumps all discovery duties on that magistrate. Get to the discovery fights early; don't let it all in on the idea that there is no jury. If you do, you are going to struggle with mountains of stuff later, at the trial and after. Problems arise with efforts to get into each other's plants and with respect to trade secrets. When you find it necessary that a trade secret be disclosed, one answer is to have it disclosed in confidence to counsel only, or to you in camera.

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other cases by what happened afterwards, it is proper and important and necessary to consider commercial success, copying by others, licenses, filling of a long-felt need and similar events in patent cases. The nexus between these features of the invention environment may be weak or strong. The weight you will attach to them will vary accordingly. But these indicia should be considered before, not after, you decide the question of obviousness. There is no warrant for disregarding any probative evidence in any case, patent cases included.

3. Don't look for or refer to the presence or absence of "invention." It will give you away as outmoded. In 1973, we still have courts referring to the presence or absence of "invention" when in 1952 Congress wrote a statute which did away with that circuitous thinking.

4. Read pages 566 through 583 and 600 through 621 of your Green Book, provided by the Judicial Center, before you start a patent trial. Those parts provide some excellent guidance.

5. Don't be concerned only with the *size* of the invention. Many judges have written, "How do you determine patentability when the difference over the prior art is very small?" The size or extent of the inventor's contribution, of itself, is not determinative. My right to my half acre is equal in law to your right to the King Ranch. The patent system exists to encourage small disclosures as well as large. It leaves it to the public to decide the *value* of the disclosure. The statute says, very simply, "Was it new?" "Was it useful?" "Was it unobvious, at the time the invention was made?" Now it may be that if the difference is very small, you will say, based on all the evidence, that it was obvious to do it. Your decision may be correct, but not because the difference was small. A small difference may constitute a tremendous advance in the art. Bell's invention of the telephone was, electrically, a "small" difference from what was known.

6. Don't let your personal opinion of what should or should not be patented creep in. It is irrelevant. It's not our business. Public policy, as we all know, is for the Congress.

7. Then, the old cliche, avoid hindsight. You do so in other cases. It is much more difficult in patent cases because there has been such a long time since the invention was made. But the statute says you must decide whether or not the invention *would have been* obvious at the time it was made. Notice the phrase, "would have been." It is disturbing to pick up a court opinion and note the judge saying "This *would be* obvious." The judge is supposed to be thinking of 15 years ago, or whenever the invention was made, and determining whether the invention *would have been* obvious under the conditions *then* existing—not after he has heard all the up-to-date stuff put forth at the trial or that he knows about. So, it's difficult, but fight off hindsight.

8. As I've indicated, don't be misled by what I call "sloganeering" in court opinions. Some of it is pretty disturbing. The subject is good for hours of discussion and would fill a whole book, but let me give you just one glaring example. In the last few weeks two circuits reversed the district court's holding of validity and in doing so fell back on the old statement that "patent claims to a combination of old elements must be scrutinized with a care proportioned to the difficulty and improbability of finding invention therein." Even beyond the outmoded reference to finding that nebulous thing "invention," that statement itself is utter nonsense. Gentlemen, I've never heard of an invention that *wasn't* a combination of old elements! The laser is merely a ruby and a light bulb and a tube. The Polaroid camera utilizes paper and light and some chemicals. The Adams battery, the patent on which was found valid by the Supreme Court, consisted entirely of old elements. Has there ever been an invention that wasn't a combination of old elements? Can you think of a way for anybody to make an invention that is not a combination of old elements?

Some slogans—like those about "constitutional standards of invention"—and "the patent privilege"—and how the invention must somehow equal "more than the sum of its parts"—and how "commercial success without invention will not make patentability"—are catchy. They read well. Most reflect the pre-1952 judicial struggle to define that indefinable thing entitled "invention." Some may be objectively true. But they are neither found nor supported anywhere in the present statute. Their only effect, today, is the obfuscation of the law.

If, as a matter of fact, judges had been following some of these slogans in patent cases since 1790, they would have struck down the patents on the telephone, the auto, the airplane, the electric light, the radio, TV, and virtually every single invention ever made. For example, a number of opinions have said "this invention cannot be patentable because it was made after many experiments." Consider the practical result of that approach. Have you any idea how many different filament materials Edison tried before he invented the first practical electric light? There have been various estimates running up to over 1,000! Was the electric light a patentable invention? Was it the kind of disclosure the patent system was designed to obtain? Of course it was. Keep in mind that the *statute* says the manner of making the invention is irrelevant.

I hope that somewhere there is a 1975 Edison, undeterred by the uncertainties of today's patent laws, who will disclose a solution to our energy problem, our pollution problem or one of our many other problems.

So much for you and the patent law. Now to you and patent litigation. In every case you usually decide the facts; you determine what is the applicable law; you apply that law to those facts; and that's the end of it. In patent cases, you add one more element. You add two foreign languages, which you must learn to use accurately. One is patent law, the other is the involved technology. So I have some suggestions:

1. Admit you don't know. Call counsel in and admit you don't know. Many patent lawyers think you do, believe it or not. Others, who know better, pretend you do.

2. As a corollary, make them educate you. That's the lawyers' job; that's what they're getting paid for. Fearing to give offense, far too few will do it unless you invite them to do so.

3. Take control early, before things pile up. Get in the act, right in the beginning. I know some of these suggestions seem trite and you have heard some of them many times in respect to other cases, but a failure to take charge from the outset is among the things coming to me from your fellow judges and that I saw from my own experience.

4. Make them simplify. It's a part of making them educate you. Simplify the technology, simplify the law,

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So a U.S. patent evidences only the right to exclude. And for 17 years—not a moment longer. Then the invention belongs, free, to the public. Gentlemen, in my view, the American patent system has provided more goods for more people, and with less understanding, public and judicial, than any other American institution.

This very simple plan we call the patent system provides, all at once, the incentive to invent in the first place, the incentive to disclose that invention, the incentive to risk the investment of the large sums and long years of effort required to bring the invention into the marketplace at a reasonable price, the incentive to design around and beyond disclosed inventions, the only deterrent to secrecy and the only marketplace for ideas we have. All disclosures have value. Even the disclosure of inventions which failed to fully solve the problem enable the research community to avoid wasted effort. And what does all that cost the public? Nothing! Zero! Not one penny! On the contrary, the inventor must pay his own application and issue fees to the Patent Office. The fees do not cover the full cost of the Patent Office, but taxes on corporations producing the inventions vastly exceed the difference. It is little wonder that Lincoln called the establishment of the American patent system one of the three greatest events in modern history.

The patent system itself is *not related* to the use made of the invention or the patent after the patent issues. Like all rights, the patent right may be abused. Sure it can. But that's no reason to attack the system.

Nor will a patent necessarily make anyone rich. *If* the patent covers a product the consumer wants and is willing to put money out for, then and only then is a patent worth anything. Many patents are totally worthless to their owners. It is useless to exclude others from the unwanted! And that is all the patent does. It excludes. Of course, all patents do add something, however small, to our total knowledge fund. So the public gets its quid pro quo, the disclosure, from 100 percent of the patents issued, even though a small percentage of the inventors ever get anything.

Because there is no way to predict at the time the invention is made whether it is worth anything or not, a money award is totally impractical and unfair to either the inventor or the taxpayer. As you recall, Fulton's steamboat was his "folly" and the telephone was a "toy."

In summary then, here are some fundamentals which, as shown by court opinions, *some* judges simply do not understand:

1. The patent is not the invention. The patent is merely the government's recognition of the inventor's intangible, legal right to exclude. That's all it is.
2. The patent is totally divorced from the right to make or do anything.
3. The patent right is property, like any other property.
4. The patent does not take from the public and give to the individual; it takes from the individual and gives to the public. It looks not to the past, but to the future.
5. A patent, every patent, *expires*. To read some court decisions, you would never know that. Often the patent expires before technology catches up and thus too soon to give the inventor of a meritorious invention any return at all.
6. The patent right is the most perishable property in existence. Even if it covers a product which consumers want, it can be and often is devalued by a new invention. That is one of the great values of the patent system. If I have a patent on this microphone and you want to compete, you invent a better or at least a different microphone. Every patent is a goad to future inventions. Closing a road produces a detour. Ideas disclosed breed new ideas.
7. The patent right, as I have indicated, is the greatest inducement to the progress of the useful arts ever conceived by man. Like the quest for the golden fleece, the effort to obtain the patent right will make our future even more abundant. As I said, if you don't think so, look around. Think about it when you get on that magnificent airplane on your way home tonight.

Now gentlemen, resulting mostly from an unthinking monopolophobia, some court opinions and writers have created and perpetuated a number of *myths* in patent law, and here are a few:

1. "The patent system is obsolete because our society and our technology are so complex." Nonsense! Remember what the system is. The public pays a fair price to get disclosures. It is not obsolete to pay judges to judge (though the pay is not much, any more). It is not obsolete to pay a worker to work—to pay a man for his house, and it is not obsolete to pay this fair price—zero—the mere recognition for 17 years of the inventor's exclusive right which he had when he made the invention—in order to get disclosures. That's what the system is. So it matters not that society and technology are complex. That's got nothing whatever to do with it. Further, the patent system does not deal with business or technology alone; it deals primarily with mental stimulation, and disclosure of the ideas resulting from that mental stimulation. It is based on human nature, and so far as I know, human nature is not yet obsolete.
2. "Many inventions today are made in corporate laboratories." The answer to that, of course, is "so what?" Remember, again, what the system is—a system to get disclosures; the *source* of the disclosure is irrelevant. We couldn't, or shouldn't care less. And incidentally, many of the great inventions are still made by individuals—working alone, working in small groups, not in large corporate labs. A lot are made in corporate labs. But that's irrelevant. We want disclosures; we don't care where they come from.
3. "Corporations prolong their monopoly by getting improvement patents." Rubbish! Again, remember what the goal of the system is—to get disclosures. Almost all patents are improvement patents. Remember that the system works just as well against the original patentee. If you have a patent, I can get a patent on an improvement of your invention. The *fact* is, there is *no way* to "prolong the monopoly" evidenced by a patent. No way at all (except by a special, and extremely rare, act of Congress). *Every* patent expires in 17 years, as I've said. The original patent on the original invention will expire at the end of its 17th year, period. An improvement patent may expire later because the invention to which it relates was made later, but the later-

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C. Regarding areas for improvement, do you agree that:
The I.R.I. should take a positive approach and some initiative?
Yes *95%* No *1%* No Answer *4%* 25 extra comments.

1. The Patent Office examination should be supplemented by public participation to improve thoroughness and openness of examination:
Yes *85%* No *13%* No Answer *2%* 53 extra comments.
Such reexamination should be after issuance:
Yes *75%* No *17%* No Answer *8%* 41 extra comments.
Such reexamination should be limited to published prior art:
Yes *53%* No *42%* No Answer *5%* 54 extra comments.
Such reexamination should be moderate in procedure and scope:
Yes *78%* No *13%* No Answer *9%* 43 extra comments.
Do you agree that the courts' and the Department of Justice's concern about the lack of public participation in the examination process will continue even if Congress loses interest in Patent Law Revision?
Yes *75%* No *13%* No Answer *12%* 40 extra comments.
2. The term of the patent should be 20 years from filing rather than 17 years from issuance.
Yes *70%* No *27%* No Answer *3%* 69 extra comments.
3. Enforceability of a patent in court is so complex, lengthy, expensive, and uncertain that the full value of the patent incentive is being eroded:
Yes *84%* No *10%* No Answer *6%* 35 extra comments.
Variance in the courts on standards of patentability is a part of these problems:
Yes *84%* No *11%* No Answer *5%* 35 extra comments.
Some legislative and judicial efforts to decrease these problems should be made:
Yes *86%* No *7%* No Answer *7%* 32 extra comments.
A single court of appeals for patent litigation should be considered:
Yes *72%* No *26%* No Answer *2%* 52 extra comments.
Would such a court, if properly organized, streamline and speed up patent litigation and make it more uniform?
Yes *76%* No *13%* No Answer *11%* 48 extra comments.
Would such a court tend to be rigid, technical, inflexible, and unable to handle issues ancillary to patents?
Yes *21%* No *64%* No Answer *15%* 69 extra comments.
If such a court did have these problems, would the improvement advantages outweigh them for the principal industrial users of the patent incentive?
Yes *59%* No *29%* No Answer *12%* 26 extra comments.
Do you know of any other legislative or judicial change which should be considered to reduce the burdens of litigation?
Yes *59%* No *11%* No Answer *30%* 84 extra comments.
Should this be used instead of, or in addition to, a single patent appeals court?
Yes *36%* No *9%* No Answer *55%* 43 extra comments.*
*(but many related to the ambiguity of the question)

4. Are there any other areas for improvement which should be emphasized in the paper?
Yes *20%* No *47%* No Answer *33%* 46 extra comments.

APPENDIX E

[*Journal of the Patent Office Society November, 1975, Vol. 57, No. 11*]

Howard T. Markey *

SPECIAL PROBLEMS IN PATENT CASES **

I suppose every speaker begins by talking about how glad he is to be here, what a great privilege it is, how honored he is, and all that sort of thing. I daresay I am no exception. I may have at least one good reason, however, for really meaning it when I say I am glad to be here. As Judge Campbell was kind enough to mention, I happen to have been one of the early group of jet plane pilots in World War II and as near as anyone can find out, there are few of that early group of seven still alive. So I'm glad to be anywhere! But we both have a job to do in the next 20 minutes or so. I have the job of giving a little talk, and you've got the job of listening—and if you finish before I do, just sit back and close your eyes. I'll wake you in time for the question period.

I've a nerve getting up here after only 27 months on the bench myself. The only excuse, I suppose, is that I may be able to tell you where some skeletons are buried in the fields of patent law and patent litigation

* Chief Judge, United States Court of Customs and Patent Appeals.

** Presented before the Judges Seminar conducted by the Federal Judicial Center, October 16, 1974.

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incentives of the patent system, not only to encourage the necessary investment of capital and effort in research and for the commercialization of inventions so that society can enjoy their benefits, but also to encourage the disclosure of inventive technology.

The grant of a limited exclusionary right by the enabling Federal patent statute in return for the prompt disclosure of newly created technology provides the basis for these incentives. Without these incentives, innovative research and development would not be supported with the degree of enthusiasm and willingness to invest risk capital that has been the American tradition. Moreover, the inventions produced by R. & D. might otherwise be kept secret to an extent which would inhibit technological progress. The exclusionary right granted under a well-examined patent does not take from the public anything that previously existed; rather, the patent right stimulates the creation, early disclosure, and utilization of *new* technology thus adding to the store of human knowledge. The exclusionary right often stimulates others to "invent around," resulting in further technical progress.

Our patent system has a number of features of significant merit which should be preserved and strengthened:

1. The basic requirements of a patent—novelty, utility, unobviousness, best mode, and enabling disclosure—are reasonably well developed in the statutes and patent jurisprudence. I.R.I. advises against attempts to legislate detailed changes or additions to these requirements or to introduce standards of judgment and disclosure that would be stricter than the American inventor, executive, or patent lawyer can reasonably understand and manage. Such attempts would result in unnecessary and undesirable uncertainty.

2. The U.S. Patent and Trademark Office generally performs well in its examination of patent applications, but there is room for improvement. It is staffed with many competent and dedicated professional employees of high integrity. I.R.I. encourages improvement in funding, training, and management of the examining corps and, especially, their administrative support.

3. The examination of patent applications should be as comprehensive and thorough as practicable so that issued patents will be respected by competitors of the patent owner and by the courts. Such respect is an essential part of the patent incentive for industry. This thorough examination need not be exhaustive, but should be reasonably prompt, however. Early issuance of worthwhile patents adds to the certainty of businessmen when considering the investment of risk capital to make the new technology available to the public; they want to know if they can plan on patents of their own and whether patents of others will cause problems. Early disclosure also helps keep the published technologies current with the actual state of advance. The balance between thorough and prompt examination should be weighted in favor of thoroughness.

4. Awarding a patent to the first-to-invent rather than the first-to-file is deemed by the I.R.I. to have continuing justification. It respects the value of the individual in American tradition and avoids inequities which can result from a "race to the Patent Office"; thorough and thoughtful reduction-to-practice of meritorious technology should continue to be encouraged.

5. I.R.I. strongly endorses the present 1-year grace period between certain events such as first sale or publication and the application filing date. This likewise facilitates thoughtful and thorough refinement of invention; it encourages prompt patent disclosure but with greater completeness than occurs under the abrupt requirements of those foreign countries which require absolute novelty without a grace period.

The U.S. patent system, despite its basic soundness and almost 200 years of valued existence, is not without areas where improvement could be made. I.R.I. encourages attention to the following areas, on a tailored basis, point by point, to avoid confused, poorly drafted, or overly detailed patent law revisions.

1. We recognize the generally sound examining skills of the Patent Office and the basic honesty and sincerity of patent applicants, patent owners, and patent lawyers. We also recognize, however, the inability of the Patent Office to examine applications as comprehensively as the public and courts might desire, even with the frequent assistance of the patent applicant in supplying prior art and other information to help the examination process. Without judging the merit of the criticisms, we believe that the examination procedure is criticized because it is necessarily conducted in secret to protect the invention before it is deemed patentable.

Therefore, the I.R.I. endorses the concept of permitting useful, reasonable, and timely post-issuance participation by the public in the examination of the invention and the propriety of the patent grant.

Such participation should occur after the patent has issued to preserve the rights of the inventor. Participation should only be permitted in a manner which strengthens the presumption of validity and adds confidence in the overall examination system; it should not unduly increase the expense and difficulty of getting a patent, and should not detract from the certainty desired by the patent owner for making a commercialization investment. The reissue practice, introduced by former Commissioner Dann, is a sound step toward this public participation, but could be improved by rule changes or legislation which would permit reasonably simple and prompt reexamination of an issued patent by permitting any person to cite prior art and possibly other reexamination considerations.[1] I.R.I. does not favor reexamination adversary proceedings of the type employed in German oppositions or U.S. patent litigation. Such proceedings would unduly erode the U.S. patent system by favoring those patent applicants with resources and by introducing unacceptable delay and unmanageable uncertainty.

2. The I.R.I. believes that the term of a patent should be changed from the present 17 years from issuance to a term of 20 years from date of the first filing. If examination is expeditious and there is no

[1] Fifty-three percent of the I.R.I. membership were in favor of limiting reexamination to published prior art; 42 percent were not in favor (see Patent Survey Results).

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Fleming could not find anyone to assist him in purifying the drug. In fact, it took a world war and an international team effort to purify the drug and make it generally available. Sir Howard Florey, who shared the Nobel Prize with Dr. Fleming for work on this drug, attributed the long delay to the fact that they did not obtain a patent for their work on the drug, and stated that this was "a cardinal error."

It is interesting to note the many ways that patents have played a part in the establishment and evolution of our free enterprise institutions . . . the many small businesses based on patents, the independent inventors who sell their inventions to large corporations and the giant corporations who owe their existence to patents. There are examples of companies who have been salvaged from the brink of disaster by the obtaining of a patent at a critical time, and companies who never sell products other than those covered by their own patent portfolio.

But, I would like to talk for a few minutes about a couple of other institutions in our system that have utilized the patent system to advance the state of our technology. The first is the granddaddy of all of the university-associated research foundations—the Wisconsin Alumni Research Foundation, established in April of 1925. This Foundation was established to acquire, administer, and license patents in a way that the income from these assets would be used to finance research at the University. One of the motivating factors in establishing this Foundation was an offer from Dr. Steenbock to assign his patent applications on Vitamin D to the Foundation. Apparently Dr. Steenbock was more interested in promoting research at the University than he was in his own financial return. The Foundation also received the right to some other highly significant inventions on anticoagulants, or blood thinners. Interestingly enough, one of those anticoagulants, the compound Warfarin, when administered to humans in therapeutic doses has proven to be a life-saving drug that has reduced the incidence of fatal coronary attacks from blood clots and has served to prolong useful life for many years. On the other hand, the same compound, when given in nontherapeutic doses to rodents, produces fatal hemorrhaging. Thus, the compound has become a specific, positive means for controlling rats and mice—two highly destructive economic pests.

The Foundation throughout its history has acquired the rights to 38 income-producing patents. Of these, nine have earned between $100,000 and $1 million and, three more than $1 million in net royalties. Although income from patents no longer supplies the major source of income to the Foundation, it provided a basis for encouraging research at the University, and in turn helped the University obtain and maintain a highly competent staff of research scientists, which in turn enabled the Foundation to attract investors from private citizens, industry, and Government to fund additional research work.

The Foundation, which was founded upon a concept of using income from patented inventions to support research work, has become a model for many other similar university-associated organizations and has become a significant factor in supporting university research and development throughout the United States.

Another example of a research-oriented foundation founded and supported by the patent system and an important institution in our free enterprise system is the Universal Oil Products Company (UOP). The company was founded in 1914 for the purpose of obtaining patents and patent applications of J. A. Dubbs and his son in the field of petrochemicals and to carry on research and development work that eventually led to the Dubbs method of processing petroleum. C. P. Dubbs, who joined UOP, participated in the research and development that resulted in the clean circulation principle, a method that would permit continuous processing of heavy oils to make gasoline. This was clearly one of the most significant breakthroughs in this field, and although it was demonstrated successfully in 1919, it was many years later before it began to pay a financial return to UOP. In fact, it is said that the primary financial backer of this company in the early days, Mr. J. Ogden Armour, invested more than $3 million before $1 of revenue became available to the company. However, by 1930 royalty checks for the Dubbs process exceeded $9 million. Throughout the years to the present, Universal Oil Products has continued to do major research and development work for the petroleum industry, although they have diversified somewhat, and now sell products in addition to licensing their technology. However, licensing income still provides a substantial part of their income which supports their research and development activities. This activity by UOP provides a way for the many small petroleum companies to participate in, and benefit from, highly sophisticated research and development work which they would not be able to perform on their own.

If you think of inventions that change the character of daily life, it is not at all clear that our generation is experiencing less change than previous ones. A man born in 1800 and dying in 1860 would have seen the coming of the railway, the steamship, the telegraph, gas lighting, factory-made clothing, and furniture. He was able, for the first time in all of human experience, to travel faster than the fastest horse, and to do so for long, continuous periods. A man born in 1860 and dying in 1920 would have seen the telephone, the electric light, the automobile and truck, the airplane, radio, and motion pictures. Think only of the way that electricity and street lighting have transformed our lives. Are the transistor, television, and the computer, major inventions of the middle of the 20th century, any more shocking in their impact on our lives than those which changed the lives of our immediate forebears?

One might question whether or not the patent system is still functioning as provided for in the Constitution, and whether it is still providing an incentive to innovation in view of economic domination of some industries by large corporations who obtain the majority of U.S. patents. You frequently hear that the patent system is outmoded because all of the inventions are made in the laboratories of large corporations by teams of inventors. This is just not factual. Even today, 25 percent of U.S.

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APPENDIX C

Presented at 29th Annual Conference
John Marshall Law School
February 20, 1976
Robert B. Benson

Patents In Our Free Enterprise System

I doubt that I will get much disagreement from this audience if I begin my presentation on the premise that our free enterprise system has produced the most advanced technological society that the world has ever known. The demand for our products and advanced technology is universal. In 1974 American corporations received $3.6 billion in fees for the sale and use of its technology, which is 10 times the amount of money that U.S. corporations paid for foreign technology. This is an amazing development when one considers that our country is just now celebrating its 200th birthday, and that most of the countries that purchase our technology were in existence long before our country came into being.

This did not happen by chance—Americans do not have a monopoly on the world's brainpower. It happened because our founding fathers with unusual foresight created an economic environment based on a free market that stimulated creativity and innovation in a competitive atmosphere that in turn produced a technological and investment chain reaction that fueled our economy to an accelerated growth that has never been matched.

The American tradition of free enterprise is based on the proven concept that a man's work would be rewarded in proportion to the degree in which his work and production satisfied the consuming needs of others who were willing to spend a share of their own labor or income to have those needs satisfied. The U.S. patent system has provided an incentive that inspired talented individuals to devote maximum mental and physical efforts to the development of uniquely American inventions. As a result of these efforts, Americans are credited with 75 percent of the world's most famous inventions, most of which have been the basis of large international corporations or businesses employing millions of people and generally improving the living standards for all of us. Whether such a patent system would have proved to be a stimulus to ingenuity under conditions prevailing in other countries is highly questionable.

For example, countries having a planned economic system such as the U.S.S.R. have not been as successful.

Daniel P. Moynihan, our recently resigned ambassador to the U.N., made the following statement:

> People in Communist countries want American products and American technology. They can produce, too, but they know that if they are to produce new technology, they will have to loosen up their society. Technological creativity comes only from a competitive society such as ours. [Communist leaders don't want a competitive society for political reasons, so they want to bring in our technology and technology is not a secret from people; it is a way of organizing. Our people know how to organize and figure out the answers. Look at our great companies . . . they are organized, they have a system that works, they are competitive.]

On the same point from another source, Arthur Downey, Assistant Secretary of Commerce for East-West Trade, made the following observation:

> Socialistic countries historically have had problems being inventive. Soviet centralized research and development is done in institutes and without trade secrets. There is presumably a freer flow of ideas for more rapid advances. But this system has not helped them extensively.

In comparison, at the turn of the century a Japanese Commissioner assigned by his Emperor to investigate the reasons for the fantastic flourishing of American economy filed the following report: "We have looked about us to see what nations are the greatest, so that we can be like them . . . We said 'What is it that makes the United States such a great nation?' and we investigated and found that it was patents, and we will have patents." Obviously, the Japanese have prospered with their patent system.

A great deal of credit for the success of our free enterprise system should be given to those men who drafted our Constitution and provided in Article 1, Section 8, the basis for our patent system. In hindsight it might be easy to say they never really envisioned that the patent system would, in fact, be such an important factor in the evolution of our country, especially since monopolies of any form were in great disfavor at that time. On the other hand, there is evidence that the drafters of our Constitution recognized that the grant of a limited monopoly to an inventor was the price that the Government would have to pay to stimulate the kind of technological growth that was necessary to develop our small country into a first-rate power.

People such as James Madison explained that, in the larger sense, society would benefit more than the inventor, because it would be assured of the benefits of his genius. Because of the full disclosure requirement in obtaining a patent, other scientists and inventors will have access to the most advanced developments in the art to use as a point of departure for their own experimentation.

This basic concept remains a fundamental part of our patent system today as pointed out by Commissioner of Patents and Trademarks, C. Marshall Dann, in a speech given last November in which he said that the primary purpose behind the patent system is not to reward inventors, but to promote the progress of the useful arts. He said that rewards to inventors are only the means to the end. The patent system works through a series of incentives. It provides incentives for people to make inventions, to invest in research and development, to make new or improved products and processes available to the public, and finally to disclose their inventions instead of keeping them secret. He stresses

> People in Communist countries want American products and American technology. They can produce, too, but they know that if they are to produce new technology, they will have to loosen up their society. Technological creativity comes only from a competitive society such as ours. [Communist leaders don't want a competitive society for political reasons, so they want to bring in our technology and technology is not a secret from people; it is a way of organizing. Our people know how to organize and

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4-16. Measures of R. & D. intensity, by industry, 1961-74

Manufacturing industry	Mean over the 1961-74 period: R. & D. scientists and engineers per 1,000 employees	Total funds for R. & D. as a percentage of net sales	Company funds[1] for R. & D. as a percentage of net sales
Group I:			
Chemicals and allied products	37.8	3.8	3.4
Machinery	26.1	3.9	3.2
Electrical equipment and communication	46.1	8.2	3.6
Aircraft and missiles[2]	85.4	19.1	3.3
Professional and scientific instruments	33.8	5.8	4.2
Mean for group I:	46.1	7.7	3.4
Group II:			
Petroleum refining and extraction	15.8	.8	.8
Rubber products	17.4	1.9	1.6
Stone, clay, and glass products	10.8	1.6	1.5
Fabricated metal products	12.2	1.3	1.2
Motor vehicles and other transportation equipment	19.8	3.3	2.6
Mean for group II	14.4	1.9	1.2
Group III:			
Food and kindred products	7.1	.4	.4
Textiles and apparel	3.1	.5	.4[3]
Lumber, wood products, and furniture	5.0	.5	.4[3]
Paper and allied products	8.3	.8	.8[3]
Primary metals	5.5	.7	.7
Mean for group III	6.0	.6	.4

[1] Includes all sources other than the Federal Government.
[2] Includes ordnance.
[3] Data for company funds are not available for several years. Mean computed using only those years for which data are available.

4-13. Distribution of applied research and development expenditures to broad product fields with the greatest shares, 1974

Broad product field	Percentage of funds to all product fields
Communication equipment and electronic components	18
Machinery	12
Guided missiles and spacecraft	11
Aircraft and parts	11
Motor vehicles and other transportation equipment	10
Chemicals[1]	7
Total	69

[1] Except drugs and medicines.

Source: National Science Foundation, *Research and Development in Industry, 1974* (NSF 76-322), p. 68.

4.22. Percentage of U.S. patents[1] owned by U.S. corporations, in product fields with the highest and lowest percentages in 1975

Product field	Percentage of patents in each product field[2]: 1965	1975
Highest percentage corporation—owned:		
Plastic materials and synthetic resins, rubber, and fibers	95	93
Industrial organic chemicals	94	92
Oil and gas extraction, and petroleum refining and related industries	92	90
Drugs	89	89
Agricultural chemicals	87	89
Lowest percentage corporation—owned:		
Construction, mining, and materials handling machinery and equipment	61	63
Miscellaneous transportation equipment	66	62
Farm and garden machinery and equipment	53	56
Ship and boat building and repairing	54	49
Ordnance, except missiles; and tanks	38	39

[1] Due to U.S. inventors.
[2] By date of patent grant.

Reference: Appendix table 4-14.

electronic components 18
Machinery 12
Guided missiles and spacecraft 11
Aircraft and parts 11
Motor vehicles and other transportation equipment 10
Chemicals[1] 7
Total 69

[1] Except drugs and medicines.

Source: National Science Foundation, *Research and Development in Industry, 1974* (NSF 76-322), p. 68.

Construction, mining, and materials handling machinery and equipment 61 63
Miscellaneous transportation equipment 66 62
Farm and garden machinery and equipment 53 56
Ship and boat building and repairing 54 49
Ordnance, except missiles; and tanks 38 39

[1] Due to U.S. inventors.
[2] By date of patent grant.

Reference: Appendix table 4-14.

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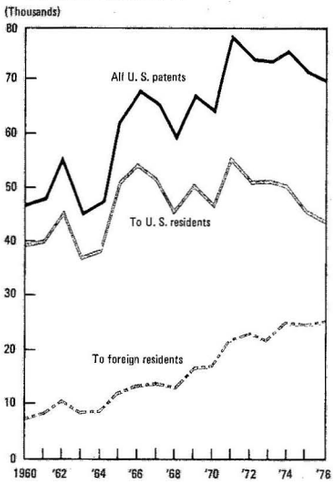
Section 5

APPENDIX A

4-18

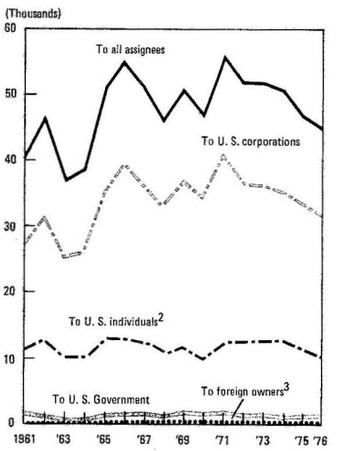
U. S. patents granted, by inventor and date of grant, 1960-76



REFERENCE: Appendix Table 4-10.

4-19

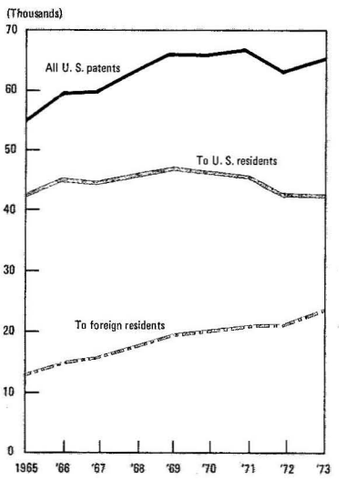
U. S. patents[1] granted, by assignee and date of grant, 1961-76



[1]Due to U. S. inventors.
[2]Comprises patents assigned to U. S. individuals and unassigned patents.
[3]Comprises patents assigned to foreign corporations, governments, and individuals.
REFERENCE: Appendix Table 4-11.

4-26

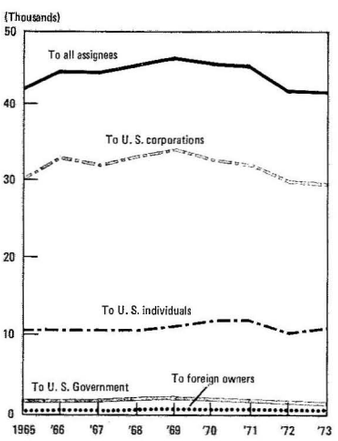
U. S. patents granted, by inventor and date of application, 1965-73



REFERENCE: Appendix Table 4-15.

4-27

U. S. patents[1] granted, by assignee and date of application, 1965-73



[1]Due to U. S. inventors.
[2]Comprises patents assigned to U. S. individuals and unassigned patents.
[3]Comprises patents assigned to foreign corporations, governments, and individuals.
REFERENCE: Appendix Table 4-16.

20
10
0
To foreign residents
1965 '66 '67 '68 '69 '70 '71 '72 '73
REFERENCE: Appendix Table 4-15.
10
0
To U. S. Government
To foreign owners
1965 '66 '67 '68 '69 '70 '71 '72 '73
[1]Due to U. S. inventors.
[2]Comprises patents assigned to U. S. individuals and unassigned patents.
[3]Comprises patents assigned to foreign corporations, governments, and individuals.
REFERENCE: Appendix Table 4-16.

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others. In many lawsuits, days of depositions are taken in an attempt to find or prove an early public use by others which may have involved very small numbers of items or very small amounts of money and which was completely unnoticed by society until a defendant in a patent suit tried to discover it.

If the public use was smaller than the amount mentioned above, it did not contribute to society and was unnoticed. On the other hand, if the use had to be at least this amount to be an effective public use bar, it should be much easier and cheaper to discover and the time and cost of patent litigation would be reduced substantially.

III. Revise sections 102a and b so that any use not obvious to the public on inspection or analysis of the product sold or available to the public is not a bar to patentability.

It can be argued that the prior user who did not disclose the invention to the public, even though the end product of his invention was made available to the public, should not be entitled to prevent another who did disclose his invention to the public from obtaining a patent.

Such a change in the law could significantly reduce discovery in a lawsuit and thus reduce the cost. Possibly the prior practitioner of this public use should be permitted to be able to continue to use the invention.

IV. Certain Patent Infringement Cases Be Given Priority in the Courts.

In patent infringement cases where the patent owner is either an individual, a small business, a university, or a nonprofit organization, the infringement case would be given priority in the Federal courts immediately behind that of the criminal cases so that a decision could be reached as early as possible. While it would be preferred that all patent cases be decided promptly, it is thought that this is one situation where it can be reasonably argued that, in lieu of having all patent cases decided promptly by possibly adopting one of the other proposals, it would be preferable to the present system to have at least some patent cases decided promptly. It is felt that, on the basis of fairness, the ones in the above categories should be those selected. If the cases can be promptly decided, the time involved and probably the actual cost of litigation would be reduced and innovation would be encouraged.

V. All Patent Trials in Federal Courts Can Only Be Before a Judge Who Is a Patent Expert.

The cost of litigation might be reduced by the appointment of more judges with technical backgrounds and adoption of a procedure that allows for assignment of technically qualified judges for those patent cases where a judge with a technical background would materially assist in expeditiously and correctly disposing of complex litigation. See the October 1978 issue of *Judicature,* which includes an article by Mr. Shapiro, Chairman of duPont, urging assignment of judges with special qualifications to handle complex cases dealing with the subject matter in which the judge is especially qualified.

G. IMPACT OF ANTITRUST LAWS ON INNOVATION

Any narrowing of the rights granted by the patent has a detrimental effect on the innovation process, because it discourages investors. Such restrictions include limitations on transferring the rights in a patent by assignment or licensing, as well as enforcement of the patent.

Patents can and have been misused through licensing practices. However, the constant attacks on licensing practices by government agencies and the courts has the net effect of eroding the value of the patent grant and hence the willingness of investors to rely on patents to justify investments in the innovation process.

Such restrictions could be removed by adopting the following recommendation, made by the Report of the President's Commission on the Patent System, 1966, which reads as follows:

> The licensable nature of the rights granted by a patent should be clarified by specifically stating in the patent statute that: (1) applications for patents, patents, or any interests therein may be licensed in the whole, or in any specified part, of the field of use to which the subject matter of the claim of the patent are directly applicable, and (2) a patent owner shall not be deemed guilty of patent misuse merely because he agreed to a contractual provision or imposed a condition on a license, which has (a) a direct relation to the disclosure and claims of the patent, and (b) the performance of which is reasonable under the circumstances to secure to the patent owner the full benefit of his invention and patent grant. This recommendation is intended to make clear that the "rule of reason" shall constitute the guideline for determining patent misuse.

Also, clarification of existing law pertaining to licenses and misuse of patents would limit the extent to which new principles of law can be established by merely giving speeches, as was done in the past by some Department of Justice lawyers.

Another means by which the Administration could keep the Department of Justice from inhibiting innovation would be to issue an Executive order requiring that the Department of Justice, Antitrust Division, conduct an "innovation impact study" *and* a "competitive impact study" *before* bringing any action against a patentee alleging antitrust violations. Such an Executive order could require that the Department of Justice find affirmatively that if it prevails in the case that competition would be increased *and* that innovation would either be increased or not deterred.

A thorough study, such as by a Presidential Commission, including not mere theorizing and suppositions, but also factual economic data and market analysis, would lead to an assessment of the extent of the decline of innovation due to the antitrust interference with the

Only Be Before a Judge Who Is a Patent Expert.

The cost of litigation might be reduced by the appointment of more judges with technical backgrounds and adoption of a procedure that allows for assignment of technically qualified judges for those patent cases where a judge with a technical background would materially assist in expeditiously and correctly disposing of complex litigation. See the October 1978 issue

patentee alleging antitrust violations. Such an Executive order could require that the Department of Justice find affirmatively that if it prevails in the case that competition would be increased *and* that innovation would either be increased or not deterred.

A thorough study, such as by a Presidential Commission, including not mere theorizing and suppositions, but also factual economic data and market analysis, would lead to an assessment of the extent of the decline of innovation due to the antitrust interference with the

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It would also be possible to make the patent incontestable if it has been used commercially for a certain number of years, such as 5 years, rather than have the period run from the issue date.

Any of these incontestable patents could reduce the cost of litigation and increase certainty as to the enforceability of patents.

Guaranteed Patents

This new class of patents would be guaranteed by the U.S. Government to the owner as to its validity. If some party wanted to challenge validity, they would sue the U.S. Government, not the owner. If a court declared the patent invalid, the owner would be paid by the Government under the guarantee, up to some maximum established by law, and consistent with the value of the patent had its validity not been contested. Guaranteed patents would not obsolete the present patent form.

The PTO would make a more thorough examination, perhaps with two examiners, of any application for patent under the new form. Because of less-than-perfect human performance, and less than complete file information, some new-form patents could still issue which would later be declared invalid. But the owner would be protected against this type of error by the Government. Without this protection, innovation is reduced because of the great exposure of personal finances and time and effort which the small business and individual inventor need to devote to commercialize the invention. Government guarantee of validity would facilitate financing. Guaranteed patents could be made available only to small businesses and independent inventors.

Elite or Super Patents

These patents would require the payment of a significant additional fee, such as $500, and a statement by the applicant that a thorough prior art and validity search had been completed, within some specified period after the patent application was filed in the PTO. The results of this search, with comments, would be submitted to the PTO, and the PTO would then make a more comprehensive search and examination than usual. It is felt that the additional search and examination, with the special search made by the applicant, would give the patent a stronger presumption of validity.

Petty Patents

Petty patents would require novelty but not unobviousness; would be limited in scope to exact copies and close variations of the invention disclosed; and would run for less than 10 years, preferably 6 to 8 years. Petty patents could be examined on the same basis as regular applications, except that they would not be subject to rejection for lack of obviousness under 35 U.S.C. 103. The PTO would charge a lower fee for petty patents.

E. OTHER PROPOSALS FOR MODIFICATION OF THE PATENT TERM

Extend Patent Term in Certain Instances

It is well known that the present patent term (17 years from patent grant) often fails to coincide with commercialization. This fact suggested the following questions:

(1) Should some sort of a tribunal be empowered to hear the facts, and make binding decisions as to extensions of life beyond the 17 years?

(2) Because of the formidable problems individuals often face in commercializing their inventions, should unassigned inventions (independent inventors) automatically be granted patent life greater than 17 years after date of issue?

(3) Should the 17-year term start after some event other than the date of issue? For example, after the date of first significant sales, provided due diligence commensurate with capability has been used to bring it into production and marketing? Or after the date of first payments to the inventor for assignment or licensing of his invention?

Certain principles would seem fundamental in any system relating to the extension of patent term:

(1) No extension of term would be warranted if a patentee had not made diligent efforts to commercially develop the invention.

(2) Delay in commercial development should be measured from the time the inventor had adequate evidence of the commercial embodiment of his invention.

(3) The patentee should be compensated with patent term extension equivalent to the period of delay and the period of extension should not be dependent upon the extent to which the patentee had or had not profited from his invention during the patent term.

It is clear that the equities determining whether extension should be granted would require review by some tribunal. Such review could occur either:

(1) By the patentee filing, at any time during the life of the patent but no later than some fixed period prior to normal expiration, a petition with a competent tribunal for extension of the patent expiration date. This petition would cite facts satisfying the statutory criteria for extension. Publication of the petition would be made and opposition to the extension could be entertained by the tribunal; or

(2) The date of an objective act on the part of patentee (such as first commercial sale) would be the date from which the patent term of 17 years is measured. Notification of such act would be given by the patentee to a tribunal and this notification would be published. The extension of the patent could be opposed by the filing of a petition by a party in interest to foreclose the extension.

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PROPOSAL IX.—CLARIFY THE STATUTORY DEFINITION OF PATENTABLE INVENTION: 35 U.S.C. §103

In the course of the foregoing discussion of a national patent court (proposal III), it was noted that the Federal circuit courts of appeal have enunciated different and incompatible views of what constitutes, and the requirements for a finding of, patentable invention.

It is the view of this Subcommittee that the creation of a national patent court will do much to eliminate these disparate views on the critical issue of what constitutes patentable subject matter and, in the process, to make for a more reliable and predictable patent system. A majority of this Subcommittee also feels, however, that the patentability standard has been subjected over the years to such a wide variety of viewpoints, some of them antithetical to the constitutional purpose of promoting all the useful arts, as to militate strongly in favor of a congressional restatement and clarification of the metes and bounds of patentable subject matter. Good legislative action would ensure not only more consistent and predictable future adjudication but that which best comports with and implements the constitutional goal of promoting the progress of the useful arts, which is the raison d'etre of the patent system. Any such clarification should not only eliminate departures from rigorous application of the statutory standard of nonobviousness, as set forth acceptably in *Graham* v. *John Deere Co.,* 383 U.S. 1 (1966), but should ensure the taking into account of the so-called secondary considerations involved in determining the presence or absence of nonobviousness.

Some members of the Subcommittee feel that, as with almost any legislative changes, legislation further defining the standard of patentability might increase rather than reduce patent litigation, and could well result in more, rather than less uncertainty in predicting the strength of patents. These Subcommittee members believe that the standard of patentability is defined in the current statute as precisely as necessary; they contend that the problem is not the statutory definition, but rather the tendency the courts have to apply the statutory definition nonuniformly (and this problem would be minimized upon implementation of this Subcommittee's recommendation for a single court to hear patent appeals).

PROPOSAL X.—PERMIT LICENSEE TO AGREE NOT TO CHALLENGE LICENSED PATENT

Some members of this Subcommittee recommend legislation permitting a licensor and a licensee to expressly contract for a licensee estoppel (under which a licensee is prevented from contesting the validity of a licensed patent) to correct perceived abuses by patent licensees.

Under the Supreme Court decision in *Lear Inc.* v. *Adkins,* 395 U.S. 653 (1969), the patent owner, who is bound by a license contract, may offer a license to a potentially major infringer coincidental with the first sign of infringement, and may for a time "enjoy" the infringer's agreement to a license under which the infringer is to pay a royalty that may be substantial if the market develops as the patentee hopes. By the act of granting the license, however, the patent owner is at the virtual mercy of the licensee if the licensee later wishes to renege on the license agreement and to challenge the validity of the patent. Indeed, at least some licensees have signed agreements planning at that time to challenge the licensed patent at a later point in time.

By granting a license to a competitor, the patentee

(1) gives up his choice of time of litigation against the competitor;

(2) gives up his choice of forum for the litigation, which sometimes is dispositive in terms of results and very commonly has great effect on the settlement figure; and

(3) has compromised too low the amount of royalty that he might get or ought to get from a valid patent because he thinks he is saving litigation costs and risks.

The licensee, on the other hand, having taken the license, is enabled by *Lear* to pick his own time for litigation when he sees the market develop, and to pick up his own forum in which to file a declaratory judgment action.

If the licensee wins then he may not pay anything following his validity challenge, though he received a very valuable consideration. Even if the licensee "loses" he can, as a practical matter, depend on the court not to assess a royalty higher than the contract's compromise low royalty as the damages, in spite of the fact that his act was quite deliberate in nature. Thus, by taking a license he never intends to honor, the licensee extorts a low royalty.

The majority of this Subcommittee submits that the solution is to statutorily restore to the law the capacity of the licensor and licensee expressly to contract for a licensee estoppel, at least so long as the license continues in force. By restoring the licensor to a position of licensing parity with his licensee, the desirable social goals of protection of the inventor's property, fairness in the law and sponsorship of innovation by the inducements of Title 35, U.S. Code, are achieved.

Some members of the subcommittee can find no reason for not affording full freedom to contract for permanent licensee estoppel. They contend that this is the only mechanism whereby litigation may be *finally* settled and the reneging licensee is not permitted to profit by his perfidy.

Other members of the Subcommittee were of the view that this proposal, which is the only recommendation of the patent Subcommittee specifically directed to the legislative overruling of a judicial decision, will have no effect on innovation. For these members, this view is further supported by what they feel is the conservative way in which *Lear* v. *Adkins* has been applied by the lower courts, and the fact that the elimination of invalid patents may remove blocks to innovation on the part of the industry covered by the patents.

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effect on the amount of funds available to support future R. & D. The erosion of patent protection or the complete lack of it in certain fields of technology puts the innovative U.S. industry in an intolerable position by depriving it of the ability to defend itself against copiers of successful innovations who have not incurred heavy R. & D. expenses in creating and developing them. Turning large geographical areas and large current and potential markets into patent-free zones and subjecting U.S. enterprises to unfair competitive pressures by local enterprises and, increasingly, also by other multinational and state-owned enterprises, will inevitably result in serious erosion of U.S. technological leadership.

Foreign trade—in the form of direct exports, foreign investment in subsidiaries, and in manufacturing facilities—is an ever-increasing important part of the business of U.S. enterprises, particularly those which are highly research-intensive. In a number of industries, foreign business activities account for 50 percent or more of total corporate sales and profits.

In order to finance research and development, maintain U.S. technological leadership, and improve the balance of trade, it is imperative that the ability of U.S. enterprises to do business abroad shall not be impeded through the action of foreign governments or groups of governments denying patent protection.

The respect for patent rights, whether owned by the nationals of a country or by foreigners, formerly universally recognized as socially and economically desirable, would also in the long run directly benefit the developing countries in creating employment, attracting investment, and encouraging the transfer of technology. A strong U.S. posture for seeking improved patent protection in Third-World countries, which would in all likelihood be supported by other Western nations, would therefore be not merely in the enlightened self-interest of the United States, but also in the long-term interest of the developing countries.

United States Government action, as outlined, to support the reestablishment and maintenance of a full and effective patent system in foreign countries would no doubt trigger resistance and protest from Third-World governments, various international organizations and Unied Nations agencies. The United States might be accused of serving its own narrow self-interest, and inflammatory slogans such as "economic imperialism" or "neo-colonialism" might also be uttered. The good faith of the United States in striving to assist developing countries in their rapid development and industrialization might also be questioned.

Nevertheless, it is submitted that there is no inconsistency. The primary and essential factor in the industrial development of Third-World countries through the transfer of technology is the voluntary, good-faith cooperation between the transferor and transferee. This is a two-way street where the security and protection of industrial property rights are an essential element. It is therefore also in the enlightened self-interest of the technology-recipient countries that inventions should enjoy meaningful patent protection.

PROPOSAL VIII.—PATENT RIGHTS TO BE AVAILABLE FOR NEW TECHNOLOGICAL ADVANCES

The constitutional purpose of the patent system is to promote the progress of the useful arts. The Subcommittee believes in the patent system, and supports the use of the patent grant as a method of encouraging invention and innovation as broadly as possible under the patent law. [8] The Subcommittee supports the following statement of Judge Markey:

> "As with Fulton's steamboat 'folly' and Bell's telephone 'toy,' new technologies have historically encountered resistance. But if our patent laws are to achieve their objective, extra-legal efforts to restrict wholly new technologies to the technological parameters of the past must be eschewed. Administrative difficulties, in finding and training Patent and Trademark Office examiners in new technologies, should not frustrate the constitutional and statutory intent of encouraging invention disclosures, whether those disclosures be in familiar arts or in areas on the forefront of science and technology." [9]

By way of example, the Subcommittee feels that patent protection should be accorded new life forms, use specific chemical formulations and computer programs.

A. New Life Forms

It is difficult to accurately forecast the extent of the benefits that can be provided to mankind by technologies which produce new, useful, and unobvious life forms. However, we have already seen a preview of these benefits in the reports of the production of insulin and somatostatin (*Chemical and Engineering News,* June 19, 1978, pp. 4, 5) and through the promise of quicker, more complete cleanup of oil spills (*National Geographic,* September 1976, pp. 374, 375) by certain genetically modified microorganisms.

At present, two patent appeals, *In re Bergy et al* (Patent Appeal No. 76-712) and *In re Chakrabarty* (Patent Appeal No. 77-535) are near resolution in the Court of Customs and Patent Appeals. Bergy relates to a life form which was found in nature but which was isolated and purified to produce a useful product. Chakrabarty relates to genetic manipulation to produce a useful life form previously unknown in nature.

If the position taken by the U.S. Patent and Trademark Office in both cases that a living thing is not patentable subject matter under section 101 of the Patent Act of July 19, 1952, is not overruled by the courts, it will be necessary to seek implementing legislation from Congress if nonplant life forms are to be patentable.

In the *Bergy* situation where life forms discovered in the natural state are isolated and propagated, the argument has been made that it is unlikely that such cultures are within the congressional intent as to patentable subject matter. Analogizing to the content of the Com-

[8] See *Patent Law Perspectives,* section A.2 at page 79.
[9] In re Chakrabarty (CCPA, 1978) 197 USPQ 72 at page 76.

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[8] See *Patent Law Perspectives,* section A.2 at page 79.
[9] In re Chakrabarty (CCPA, 1978) 197 USPQ 72 at page 76.

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part in commercializing inventions, making new products available to the public. The Federal Government does not normally participate in this function. It is not necessary for the Federal Government to go through the expensive, time-consuming procedure of obtaining a patent to fulfill the function of disclosing information to the public. This can be accomplished by a simple publication.

The theory of the patent grant is to give the inventor or his assignee the exclusive rights to his invention for a period of time so that he can invest the time and money necessary, commercialize the invention and develop a market for the product, or process incorporating the invention. Since the Government is not in the business of developing inventions for commercial use, it has no need to own patents. On the other hand, the Government is a substantial user of products and services and in that context needs, or at least can benefit from, a license to use patents.

Experience has shown that the Government, as a purchaser or consumer of goods and services, is not in a position to take advantage of its ownership of patents to promote enterprise. Private companies, on the other hand, who are in a position to utilize the patent grant are ordinarily unwilling to take a nonexclusive license under a government-owned patent and commit the necessary funds to develop the invention, since it has no protection from competition. This is a major reason that over 90 percent of all government patents are not used. Another important reason is that the Government obtains patents on technology which, in the opinion of the private sector, does not provide an attractive business opportunity.

Several years ago, the Federal Council for Science and Technology supported the most thorough study ever conducted on the issue of government patents, commonly referred to as the Harbridge House Report. The following findings were included in the report:

> "Government ownership of patents with an offer of free public use does not alone result in commercialization of research results.
>
> "A low, overall commercial utilization rate of Government-generated inventions has been achieved; that rate doubled, however, when contractors with commercial background positions were allowed to keep exclusive commercial rights to the inventions.
>
> " 'Windfall profits' do not result from contractors retaining title to such inventions.
>
> "Little or no anticompetitive effect resulted from contractor ownership of inventions because contractors normally licensed such technology, and where they did not, alternative technologies were available."

The idea that what the Government pays for belongs to the people is not only appealing, it is true. The question is: What instrumentalities can be brought to bear to maximize the possibilities that the people will indeed have available the fruits of their government's expenditures? Nonexclusive licenses to *undeveloped* inventions, offered by the Government or anyone, have few takers, whereas patent ownership or exclusive licenses of sufficient duration are much more likely to attract the money and talent needed to make and market real products to meet consumer needs.

If the results of federally sponsored R. & D. do not reach the consumer in the form of tangible benefits, the Government has not completed its job and has not been a good steward of the taxpayers' money. The right to exclude others conferred by a patent, or an exclusive license under a patent, may be the only incentive great enough to induce the investment needed for development and marketing of products. Such commercial utilization of the results of government-sponsored research would insure that the public would receive its benefits in the way of products and services, more jobs, more income, etc. The cost of government funding will be recovered from the taxes paid by the workers and their companies.

Therefore, all the members of this Subcommittee recommend transferring the patent rights on the results of Government-sponsored research to the private sector for commercialization. In the case of university or private contractor work sponsored by the Government, the members of this Subcommittee recommend that title to the patents should go to the university or private contractor, but some members feel the Government should have "march-in-rights" (i.e., when the invention is not being used and it appears that there is a public need to transfer patent rights to those in the private sector willing to use the invention). With respect to inventions made by government employees at government expense, the Subcommittee members are divided about equally between those who feel that the government employee should have title to the invention, and those who feel that such inventions should be transferred to an independent, nongovernmental organization, perhaps modeled after the Connecticut Product Development Corporation,[7] or auctioned to the private sector or transferred to the private sector in some other manner. In all cases, the Government would retain a nonexclusive license to use and have made for its use inventions founded in whole or in part by governmental expense.

At the present time, the Government has a portfolio of 25,000 to 30,000 unexpired patents. These include patents arising as a result of research and development work in government laboratories by government employees, and also from work done by nongovernment employees wherein the Government retained title because it funded the work. In fiscal 1976, 2,646 patents were issued to the Government, of which 1,824 were for inventions by government employees.

Considerable sums of money are involved in Government patent ownership, the patent budgets of the various government agencies including funding for patent attorneys, supporting staff and equipment being in the millions of dollars.

Our information indicates that the U.S. Government has been filing in excess of 3,000 U.S. patent applications per year, which amounts to approximately 3 percent of the total workload in the U.S. Patent and

[7] 111 Lafayette Street, Hartford, Conn. 06106. See appendix F.

they did not, alternative technologies were available."

The idea that what the Government pays for belongs to the people is not only appealing, it is true. The question is: What instrumentalities can be brought to bear to maximize the possibilities that the people will indeed have available the fruits of their government's expenditures? Nonexclusive licenses to *undeveloped* inventions, offered by the Government or anyone, have few takers, whereas patent ownership or exclusive licenses of sufficient duration are much more likely to attract the money and talent needed to make and market real products to meet consumer needs.

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enhance the validity and enforceability of U.S. patents. Such improvement should include expansion of the PTO examining corps to permit more thorough searching of the prior art without increased application pendency. Emphasis should be placed on the quality of the patent examination and not on quantity of applications examined. The PTO should expand its quality control program to review a greater sampling of allowed patent applications, thus ensuring more uniformity in the quality of the issued patents. Furthermore, the PTO should improve the integrity and completeness of the PTO's primary search tools, i.e., the patent search file and its scientific library.

The Subcommittee further recommends that, to the extent feasible, the PTO develop, have developed, or use an available computerized patent and prior art search system to better assure the findings and consideration of the closest prior art by the examiner.[2] By developing such a system, eventually containing all U.S. and foreign patents and publications and constantly updating it as new references are received, the PTO will reduce the time required to complete prior art searches by examiners. If such data base was made available to inventors and their patent attorneys, many patent applications would never be filed because of art located in such search. Those that were filed would more readily distinguish the invention over the closest prior art, leading to less protracted prosecution in the PTO. The value of such a data base to inventors and industry should not be overlooked. By locating and obtaining copies of references in particular area, there would no longer be any occasion to reinvent the wheel and that time and energy could be spent in further innovations over those already known.

This Subcommittee also recommends legislation which would obligate the Treasury to earmark certain patent and trademark fees for use by the Patent and Trademark Office, such as H.R. 13628, introduced on July 27, 1978, by Representative Peter Rodino (D-N.J.). Under the proposed legislation, certain patent and trademark fees would be credited to the PTO appropriation and would be used to pay the costs of PTO products (e.g. copies) and services (e.g., examination and registration). In the past, the fee monies have not been earmarked for PTO use.

The bill would also give the Commissioner greater authority to set the fees for PTO products and services. Under current law, many fees must be set by Congress.

PROPOSAL II.—PROVIDE FOR REEXAMINATION OF PATENTS

One of the fundamental problems of the existing patent system is that pertinent prior art is very often found after patents have issued and become commercially important. Therefore, in addition to the highest priority proposal to upgrade the initial examination, there is a need for an opportunity for the PTO to consider such art.

Additional prior art, not considered by the PTO, creates uncertainty concerning the enforceability of patents. This uncertainty often deters patent owners or licensees from commercializing the invention; it can also deter commercialization by interested parties who cannot quickly and cheaply assess the value of the patent. Resolving this uncertainty as to the strength of patents through litigation is slow and very expensive. Such uncertainty, coupled with the time and expense of litigation, can be used by infringers to avoid respecting patents (especially patents owned by independent inventors and small businesses) which in turn reduces the value of the patents as an incentive to innovate. Therefore, a need exists for a fast, inexpensive method for increasing the certainty as to the enforceability and scope of patents over prior art not considered by the PTO.

Accordingly, the Subcommittee proposes that the PTO initiate a system for the reexamination of U.S. patents by *any* party requesting such reexamination during the life of the patent. The reexamination system should provide for submission of written arguments by the patentee and other interested persons concerning patentability over prior patents or printed publications. Such reexamination should be handled on an expedited basis by the PTO so that a prompt decision can be rendered. If the claims are held to be patentable over the cited art, the presumption of validity of the patent is enhanced and patentees and interested parties would have a clear idea about the strength of the patent, without resorting to litigation. In some instances, the reexamination procedure should help avoid litigation costs.

If the patent claims were held to be invalid over the cited art, the patentee would have the right to amend his claims and to define his invention more accurately or assert his position to the Board of Appeals and, on appeal, to the Court of Customs and Patent Appeals or the U.S. District Court for the District of Columbia.

This reexamination system would be available whether or not the patent to be reexamined was already involved in litigation. In such case, however, it would be solely within the court's discretion as to whether the litigation should be stayed pending the reexamination, so as to avoid undue delays in obtaining a final court adjudication.

The importance of having prior art relied upon to invalidate a patent reviewed in the first instance by the PTO, when obtainable without delay of infringement litigation, cannot be too highly emphasized. Indeed, reliable statistics suggest that a significantly higher percentage of litigated patents are held invalid where prior art relied on in court was not previously considered by the PTO than was the case where the prior art had been so considered.[3]

The Subcommitte recommends enactment of suitable legislation [4] to fully implement the reexamination sys-

[2] This is substantially identical to a primary recommendation being made by the Information Subcommittee.

[3] See Koenig, "Patent Invalidity—A Statistical and Substantive Analysis" (Clark Boardman Company, Ltd., 1976).

[4] Such as H.R. 14632, 94th Congress, January 30, 1976, as modified by Resolutions Two and Three of the August 1977 annual meeting of the Patent, Trademark and Copyright Law Section of the American Bar Association, the effect of which is to (1) give the courts discretion to stay litigation for determination of the issue by the PTO, and (2) provide third parties who have initiated a reexamination proceeding to have an opportunity to submit a written response to the statements filed by the patentee.

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inventions.[13] Large and small firms which have a higher utilization of patents tend to experience greater sales growth than firms with a lesser utilization of patents.[14]

Eighty-five percent of U.S. exports are made by only *1* percent of U.S. companies.[15] There is a strong correlation between exporting and R. & D. in the United States. There is a positive trade balance in R. & D. intensive products and a negative trade balance in non-R. & D intensive products.[16] There is also a positive trade balance in technology transfer.[17] A positive relationship appears between increased exports to foreign countries and patent filing in respective countries of export; i.e., the more patents, the more subsequent exports.[18] Improvements in our ability to innovate could have a significant impact on our balance of trade.

About 50 percent of all litigated patents are held invalid, which is virtually the same outcome as in many other fields of litigation, such as wills, land titles, and contracts;[19] however, a higher percentage (about 65 to 70 percent) of appealed patent cases result in holdings of patent invalidity.[20, 21] Patent litigation is extremely expensive; members of the committee who handle patent litigation report that they advise clients to be prepared to spend at least $250,000 for patent litigation.

[13] Richard L. Sandor, "The Commercial Value of Patented Inventions," *Idea,* 15:557, winter 1971–72, at page 562:

> ". . . it is not really the total number of patents which a firm has assigned to it which increases profit but only those which are used. The aggregrate number of patents may over- or underestimate the effect of inventive activity on profits."

[14] *Supra,* footnote (1), at page 352. There is a slight, but not statistically significant, tendency for small firms with a high propensity to patent to experience greater percentage sales growth than large firms with a high propensity to patent. See pages 366 and 367. Dale and Huntoon also observe that firms with high R. & D. tend to show more sales growth than firms with low R. & D.; and, firms with both high R. & D. and a high propensity to patent tend to experience greater sales growth than other firms.

[15] Business Week, April 10, 1978, pages 60 through 66.

[16] *Supra,* footnote (6), page 116.

[17] *Ibid.,* page 31.

[18] *Supra,* footnote (1) at page 352.

[19] Howard T. Markey, Chief Judge, U.S. Court of Customs and Patent Appeals, "The Status of the U.S. Patent System—Sans Myth, Sans Fiction," address before the European Study Conference, London, England, January 25, 1977, reprinted in *J. Patent Office Society,* Volume 59, No. 3, March, 1977, page 164 at page 169. Chief Judge Markey notes that many more holdings of invalidity are reported than holdings of validity; he also suggests that the number of appellate patent decisions does not represent a statistically valid sample of U.S. Patents:

> "The fundamental error which has caused so many from other nations to join those Americans looking askance at the U.S. patent system, is the employment of statistics to gage court attitudes. The number of appellate patent decisions is simply too small to justify the drawing of any conclusions, as some of the reporters of statistics have themselves cautioned in their reports. The number of patents adjudicated by the appellate courts between 1968 and 1972, for example was less than ⅓ of those adjudicated in the district courts, only 11 percent of those on which suit was filed, and less than 2/10 of 1 percent of those issued. Between 1953 and 1971 over 1 million patents were issued. Only 1,080 were litigated or 0.1 percent. The total number of patents subject to litigation, i.e., those issued up to 17 years prior to 1953, is even greater and further reduces the statistical sample to far less than 0.1 percent. Conclusions drawn from such a *de minimis* sample in any other field would be laughed off the stage by trained statisticians." (page 167)

[20] *Ibid.,* page 171.

[21] In Germany, in 1975, 90 patents were challenged for invalidity. Twenty-two percent were found invalid, and another 19 percent were found partially invalid. See Bernard Nash, "Remarks Before the Industrial Research Institute," Philadelphia, October 18, 1976, reprinted in *J. Patent Office Society,* Volume 59, No. 3, page 143 at page 147.

STIMULATION OF INNOVATION BY THE PATENT SYSTEM

Our Subcommittee concludes that the patent system is an essential element in our free enterprise system in the United States, has performed exceptionally well, and has made a significant contribution to the economic development of our country.[22] This is so well accepted by the members of our Subcommittee, who have worked for many years directly with the patent system, that we tend to take it for granted. Studies have concluded that the patent system has performed well its Constitutional mandate "to promote the progress of . . . useful arts." [23, 24, 25] These and other studies set out many well-known examples which illustrate how the patent system has stimulated the decision to commercialize inventions, resulting in large financial gains for individuals, firms, and the country (e.g., taxes and jobs). Many less well-known examples of important inventions commercialized at least in part as a result of the patent system, and which have resulted in more modest financial rewards, appear in reported tax cases.[26]

Several qualitative studies [27, 28] including recent studies by the United States Patent and Trademark Office and the Industrial Research Institute [29, 30] have concluded that the patent system, while fundamentally sound, could be strengthened so that it does a better job in promoting decisions to commercialize inventions. While the subcommittee can cite no rigorous evidence which establishes that changes in the patent system could have a major impact on the rate of R. & D., there is a consensus among the members of the Subcommittee that the availability of reliable patents has an impact on the focus of R. & D. and on decisions to invest in the commercialization of patented products.

Continuing efforts by governmental spokesmen within the Department of Justice and the Federal Trade Commission to limit the available methods of commercially using patent rights has had the effect of reducing the usefulness of patents in raising capital, especially for the purpose of completing the innovation process by commercializing the invention.

One of the ways to encourage investment to complete the innovation process by commercializing inventions is by reducing the risks involved in decisions to commercialize. The risk of commercializing invention can be reduced if the inventions are the subject of reliable patents [31] and if uncertainties relating to the utilization

[22] Memorandum for Jordan J. Baruch, Assistant Secretary for Science and Technology from Donald W. Banner, U.S. Department of Commerce, Patent and Trademark Office, dated October 13, 1978.

[23] "Industrial Research Institute Position Statement on the U.S. Patent System," 1978. See appendix D.

[24] "Study of the Subcommittee on Patents, Trademarks and Copyrights of the Committee on the Judiciary," U.S. Senate, Study No. 1, U.S. Government Printing Office, 1956. See, for example, page 12, footnote 26, and page 15.

[25] David Rines, "Do We Need a Patent System," *J. Patent Office Society,* Volume 51, No. 8, August, 1969.

[26] See D. C. Richards and G. E. Lester, "A Patent Harvest," *1975 Patent Law Annual,* pages 1 through 12, for several representative case histories.

[27] "Report of the President's Commission on the Patent System," U.S. Government Printing Office, 1966.

[28] E. A. Gee and C. Tyler, *Managing Innovation,* pages 222 through 234.

[29] *Supra,* footnote (22).

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11 percent of those on which suit was filed, and less than 2/10 of 1 percent of those issued. Between 1953 and 1971 over 1 million patents were issued. Only 1,080 were litigated or 0.1 percent. The total number of patents subject to litigation, i.e., those issued up to 17 years prior to 1953, is even greater and further reduces the statistical sample to far less than 0.1 percent. Conclusions drawn from such a *de minimis* sample in any other field would be laughed off the stage by trained statisticians." (page 167)

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Section 1

BACKGROUND

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Report of the Industrial Subcommittee for Patent and Information Policy of the Advisory Committee on Industrial Innovation

This Subcommittee was asked to examine the effect the U.S. patent system has on the innovation process, determine if some aspects of the patent system are inhibiting innovation and recommend changes in the system which could further stimulate innovation. For purpose of this report, the innovation process includes all the steps from conception of an idea through research, development, engineering, and marketing to the commercialization of a product or process incorporating the original idea.

SUMMARY

In general, the patent system has served the country well. Major overhaul of the patent system is not recommended. Nevertheless, some modification to the system could have a beneficial effect on innovation. The most serious problems with the patent system are the uncertainty about the reliability of patent and the long time and high costs associated with resolving such uncertainty through litigation. When proper consideration is given to these problems as they relate to those independent inventors and small businesses whose success—and indeed very existence—depends upon the innovation process, it becomes clear that some changes must occur. These problems deter investment of the money required to commercialize an invention (a necessary and expensive step in the innovative process). It is here that modifications to the patent system can have their most beneficial impact. Steps should be taken to increase the assurance that a patent is a valuable piece of property, something that offers protection to subsequent investment.

The committee has identified four major goals to which attention must be addressed to enhance the innovation process through improvement of the present patent system:

1. Enhancement of the reliability of the patent grant to the inventor and those investing in the commercialization of his invention;
2. Reduction in the cost—both in time and money—of judicial enforcement of the rights derived from the patent;
3. Extension of the availability of commercial exclusivity derived from patents to new technological advances and technological advances whose patentability is presently in question; and
4. Development of systems transferring the commercial rights to government-supported invention to those in the private sector capable of their innovation.

We have three major recommendations to improve the reliability of the patent grant.

1. Upgrade the Patent Office by:

   a. Providing an adequate examining staff to assure a rigorous high quality examination. This would increase confidence in the patents that are issued.

   b. Providing modern research tools that increase the probability of finding the relevant prior art. This would be a cost-effective investment by reducing research time per examiner, as well as reducing the frequency of subsequent proceedings to argue the prior art.

2. Provide a reexamination process—available to all interested parties—in order to ensure that the patentability of the invention described in the patent has been considered by the Patent Office in the light of all relevant prior printed publications.
3. Provide a central court to hear patent appeals. This would provide greater consistency in judicial decisions, thus reducing uncertainty.

To reduce the present cost of judicial enforcement of the patent grant, a request should be directed to the Supreme Court, and the Judicial Conference, to require each Federal court to exercise a high degree of control over the conduct of patent litigation, with particular concern for the time and expense of discovery.

To foster commercialization of inventions made in governmental laboratories, under government research contracts and in university laboratories supported with Federal funds, the subcommittee recommends that the commercial rights in such inventions be structured in a manner capable of being transferred to industry—small or large—to ensure capital investment in their development. Such transfers should be subject to a license right reserved to the Government to ensure no further payment for governmental use of the invention.

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information has been released and the company has thereby suffered. In at least one of the symposia held as part of this Domestic Policy Review, the participants agreed that there really wasn't material for any such list.

If the Freedom of Information Act has already been amended to exempt trade secrets, surely the solution is not to further amend it by adding a clause which says we meant what we said. If every amendment, every document had to be followed with a "we're not kidding" clause, democracy would face a grave danger.

The problem is that there is no criteria against which to define a trade secret or piece of privileged information. The chemical formula or proportion of ingredients considered to be a trade secret by a company may be the very information critical to a union which must determine the extent of an occupational hazard for its workers. Which should be given the priority in the public interest?

The Freedom of Information Act was passed against the background of some distressing examples of government paranoia, which labeled minutia and trivia on the one hand, and government misdeeds on the other, as classified information. The public has learned from the experience to be leary of the need for secrecy.

The Public Interest Subcommittee calls for the development of very specific, tight criteria as to what constitutes a trade secret or privileged information, to be used under the present law. We would place the burden of proof that information falls under that standard on the industry.

International Transfer of Information

Another concern of the Industry Subcommittee was the difficulty American business has in obtaining sufficient information about foreign trade and business opportunities. According to the Industry Subcommittee, this lack of information results in a situation in which foreign business can easily compete in the United States because the U.S. Government gives out all sorts of information, while U.S. companies have little similar information from abroad. The industry recommends, among other things, that the U.S. Government should engage in more extensive and active data collection on foreign opportunities and limitations. It adds that the Government should restrict itself to collecting basic information and making this available, so as to encourage private information services to add value to it by processing and distributing through various media.

Again, the evidence of need for increased government actions is inconclusive. The huge U.S. multinational corporations undoubtedly have little need for government assistance in assessing foreign markets. Yet the type of private information services which process and redistribute business information typically have fees which are difficult for a small business to absorb, particularly at the state of planning for exporting when they are most necessary. As the Industry Subcommittee admits, much of this information is available in the Government today. It is not unreasonable to expect businesses interested in exporting to make a few telephone calls to seek out such information.

It is an open question in our minds as to whether some of the legendary problems U.S. business has in operating in other countries is a matter of gaps in information or is instead a matter of willingness to make adaptations or innovations based on known information. There are so many examples of American industry trying to operate abroad in a totally ethnocentric manner, having every opportunity to learn about cultural differences but choosing to ignore them, that it is difficult to accept the proposition that lack of information is the true problem. At the symposium on this report, the example was given of the U.S. manufacturer who tried unsuccessfully to market blenders in Japan. When the U.S. commercial attache informed the company that the problem was that the Japanese had a strong cultural preference for rounded over square buttons, the company didn't modify its design. It withdrew from the market. Information was not the problem, it was unwillingness to adapt.

A more chilling example of this type of behavior was revealed by the World Issues Office of the United Church Board for World Ministries. They report that Bristol-Meyers is marketing infant formula in Haiti without even bothering to affix a French or Creole language label. The potential for misuse of the formula when it is substituted for traditional mother's milk and the risk of a decline in infant nutrition is very great. Bristol-Meyers knows—has the information—that the languages in Haiti are French and Creole. They irresponsibly chose to ignore that information.

In the face of these questions, and in the absence of evidence of probable public benefit, we cannot concur with a recommendation to increase government expenditures to improve information about foreign markets.

It is true that the U.S. Government gives out many different kinds of information—about standards and regulations, about labor force and material supplies, about the demographic composition of specific markets, and so on—which may be very helpful to both U.S. and foreign businesses. Open, freely available information is an important aspect of public policy in the United States. It is also true that all other governments do not act in the same manner. We do recognize that this might cause difficulties for U.S. businesses. We would support making the elimination of the nontariff barriers to U.S. exports which exist in other countries—including barriers of information or standards—a high priority of U.S. diplomacy.

Summary

To summarize, we are skeptical about embarking on new government expenditures for collecting information for use by the business community. We see little evidence that such information is lacking, or that more information would improve innovation. The Public Interest Subcommittee also opposes any weakening of the Freedom of Information Act. The protection for proprietary information and trade secrets now available under that act should be sufficient. And finally, we would reiterate again that Government-sponsored innovation should not be withheld from the public, nor should the public have to pay a premium to a monopolist to enjoy the benefits of that tax dollar-sponsored innovation.

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RECOMMENDATION

Government should establish a policy that, except for confidential and classified materials, all information created and collected by the Government should be made conveniently accessible at incremental costs to help widen its distribution and use.

II. Government Information And The Private Sector

Most of the bodies of information in government possession have been created or collected primarily for government purposes. There is a continuing question as to whether, in any given instance, the Government or the private sector should take the further steps involved in handling the information in the various ways that may be necessary to enhance its usefulness to the public and to accomplish its widespread dissemination. The role of private sector information companies can be extremely important in these functions. In part, this is so, because they save taxpayers the cost of the service. But much more important is the fact that private companies are essentially agents of the *users* of the information and have a powerful economic incentive to seek out information useful to the market; to index, abstract, reformat, organize, combine and package it in ways that make it more valuable; and to get it, in a pin-pointed and timely fashion, to those in the market with a specific need for it.

Obviously, the entire role of dissemination cannot be reserved for the private sector; nor should it be reserved for the Government simply because the raw data were collected at government expense. There are appropriate roles for each. Whenever it is essential to the true usefulness of the data to have it selected, processed, and packaged for the benefit of particular users, private sector participation will be very important.

Without becoming involved in the more general discussion of exactly what the appropriate roles ought to be, it can be stated that if the Government through its policies reduces the flow of information to the private sector, it can negatively impact the availability of information for innovation. This reduction in the flow can result because of direct government preemption of a field, e.g., no private sector company would attempt to perform the on-line bibliographical services now provided by the National Library of Medicine.

Much more serious can be the inhibition of private investment *by fear of future government competition.* It is not possible to measure the consequences of this concern, as fear of government competition is usually only one of several factors affecting investment decisions in an area. But, it is evident, for example, that no firm is likely to undertake substantial new investments in the dissemination of technical information on patents while uncertainty remains as to whether the Government will undertake a major program in this area itself.

There are recent instances of Government's willingness to enter an information field in competition with already established information services and so tend to discourage private investment in any new undertaking to add value to or disseminate Government-oriented information.

MEDLINE Issue

One of the better known cases involves the National Library of Medicine (part of HEW) and its MEDLINE, an on-line bibliographic searching service.

When approached by a private corporation—Systems Development Corporation—to acquire the tapes, NLM had set a price of $50,000 in contrast to the $5,000 cost which would probably be charged by other organizations for supplying an equivalent number of tapes.

Government Printing Office Microform Issue

The GPO issue revolves around a 1970 decision of the Government Printing Office to begin publishing government documents in microform, supplying them free of charge to "depository libraries"—approximately 1,200 libraries designated as official outlets for government documents—so that the public may enjoy easy access to such documents.

Until that time, despite GPO's Congressional mandate, GPO had been unable to adequately service the libraries' requests for print documents and during this period, a few private sector companies began to fill the void.

These companies brought to the task the ability to systematically identify, catalogue, microfilm and supply the documents to libraries and others, in a manner not previously existing.

When GPO made known its 1970 modernization program (including the plan to supply the documents in microform), affected elements of the information industry were faced with the threat of Government preemption, since a large part of their customer base (the depository libraries) would begin in many instances to receive at no cost direct duplications of materials already available from private sector companies, as well as the Commerce Department's own National Technical Information Service.

On the other hand, Government should be willing to enter or assist private companies to enter an information field when gaps become evident. Some or these unfilled needs for innovation-related data may be caused by the speculative nature of the investment (given the developmental state of technology) or the fact that startup costs are beyond the resources of the smaller information companies which may be the most innovative. These needs could be effectively met by private firms in cooperation with Government.

A number of approaches are available to Federal agencies that might be helpful in encouraging the initiation of such services without unduly heavy Federal investment or responsibility for continuation. One such approach might be for the Government to assume the expense of initial collection of data for a data base; another might be the guarantee of an initial number of government subscriptions; still another might be the availability of investment tax credits for investments in the development of data bases and computer programs. The experience of the National Science Foundation in stimulating the development of model secondary school curricula in the basic sciences published by private sector firms may provide an example. When appropriate, Federal investments can be recovered by agreed upon royalties.

firm is likely to undertake substantial new investments in the dissemination of technical information on patents while uncertainty remains as to whether the Government will undertake a major program in this area itself.

There are recent instances of Government's willingness to enter an information field in competition with already established information services and so tend to discourage private investment in any new undertaking to add value to or disseminate Government-oriented information.

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other way privileged will in actuality be treated as exempt from disclosure.

The lack of certainty that proprietary information which has been properly identified and submitted to the Government will be protected from disclosure to competitors directly impacts an individual's or firm's willingness to generate the information in the first place or to invest the necessary resources to develop the information in a commercial setting, i.e., a commercial product, process, or service.

> Testimony submitted by Niels Reimers of Stanford University to the hearings held by the House of Representatives on October 3 and 4, 1977, indicates that premature publication of basic research proposals made to government agencies by contractors in the hope of government funding, particularly in the field of academic biomedical, health and other basic research has been detrimental to innovation.
>
> Also, a recent FDA-sponsored study estimates the release of certain drug registration data from FDA's file would quickly result in the loss of approximately $600 million of U.S. companies' foreign established drug market sales.

The Freedom of Information Act has encouraged requests to agencies for the kind of competitively useful information described above. Without a consistent interpretation policy and because individual agencies fear sanctions under the Act, they are reluctant to deny requests for such data, and the burden of complying with the act has caused the agencies to unduly favor the rights of requestors over the rights of those submitting the information. The Freedom of Information Act was intended to subject the administrative branch of Government to public scrutiny; it was never intended to intrude on private confidences or require the release of proprietary information.

RECOMMENDATIONS

Government should establish and enforce a consistent policy for interpretation of Freedom of Information Act to make clear that information which is classified as described in subsection 552(b)(4) shall not be released under the act. As part of that policy, it should be directed that any agency discretion which may exist to release information classified in subsection 552(b)(4) shall be exercised in favor of nondisclosure, unless some other statute specifically mandates its release.

Congress should amend the act to require reasonable notice so that the concerned party can be informed of the request and the intended response by the agency or department in sufficient time to protest its release and prevent the publication of trade secret or other privileged information, if that is appropriate.

PROTECTION OF DATA BASES AND SOFTWARE

Software is the power source of the information age. It drives the computer, communications installations, and networks that make it possible to gather, organize, store, analyze, retrieve, and disseminate information.

Copyright and patent laws have not adequately protected software. Rights to software are generally protected by withholding the know-how or licensing its use by others under nondisclosure agreements. The availability of more powerful software makes it possible to manipulate data, to conduct scientific experiments and, in general, to advance the state of the art. The failure to protect this intellectual product causes its owner to restrict its use. More important, it increases the risk associated with software development and, thereby, reduces the flow of investment capital into software development.

In examining the exposures of noncopyrighted and nonpatentable software to improper use of exploitation and the impact of the failure of current laws to fully protect the software itself, the Subcommittee heard from numerous software producers and hardware companies with heavy software development capabilities. It would appear that the copyright laws that have just gone into effect have advanced considerably the protection of data bases.

At the same time the new copyright laws were being drafted, the Congress created CONTU (the National Commission on New Technological Uses of Copyright Works) to submit recommendations relative to software and data bases as well as photocopying.

After 3 years of study, CONTU recommended in relationship to software or programs:

> The new copyright law should be amended (1) to make it explicit that computer programs, to the extent that they embody an author's original creation, are proper subject matter of copyright; (2) to apply to all computer uses of copyrighted programs by the deletion of the present section 117; and (3) to assure that rightful possessors of copies of computer programs can use or adopt these copies for their use.

With respect to the data bases, CONTU recommended,

> The Act of 1976 should be amended to apply to all computer uses of copyrighted data bases and other copyrighted works fixed in computer-sensible media by the deletion of its present Section 117.

The Subcommittee believes that the implementation of the CONTU recommendations would adequately protect software and data base development and, hence, the potential value of software development to innovation, and endorses those recommendations.

The use of a patent, in addition to the copyright, in principle, is available to software if it meets the stated criteria for patentability. In practice, only a small fraction of software meets the criteria, but that which does has encountered serious difficulty in convincing the Patent Office (or the courts) to issue a patent. For example:

> In 1972, Glen Chatfield of Duquesne Systems, Inc., filed a patent application for a software system called "Regulator". He was within a week of getting the patent when the *Gottschalk* vs. *Benson* decision was handed down by the Supreme Court. The *Benson* decision ruled against a patent in that particular instance but said that some programs were patentable.
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To the extent that, as here, such foreign R. & D. activities produces technologically superior products for use in the U.S., the issuance of such a countervailing duty would be a negative influence discouraging such desirable activity. Perhaps more importantly, such an action by the Government could well cause retaliatory actions by foreign governments in the form of countervailing duties being imposed upon the importation of U.S. manufactured products where those products had benefited from R. & D. grant money from the U.S. Government.

ATTACHMENT E

ADVANCED TECHNOLOGY DEVELOPMENT

Many U.S. companies have cross-licensing agreements with foreign subsidiaries or affiliates relating to technology sharing and development for certain products offered in the worldwide marketplace. The information processing industry is one example of such international agreements.

In the domain of large information processing systems the industry has constantly pushed at the frontiers of computing speed. Until now, the principal limitation on computing speed has been the intrinsic speed of electronic switching circuits; consequently the industry (in collaboration with the semiconductor industry) has pressed for increases in intrinsic circuit speed. This pressure continues, but now the speed of circuits is so great that computing speed is also limited by the time required to propagate electrical signals from one electrical circuit to the next one. Since the speed of propagation is limited by the laws of nature, the time of propagation can only be reduced by reducing the distance between circuits. The technology for accomplishing such reductions in distance is referred to as packaging.

The U.S. company and its foreign subsidiary have developed first generation packaging technology, exchanging technical information under the cross-licensing agreements. Such exchange of technical information is important in reducing the development cost for each party and thus improving the productivity of the personnel engaged in development work. The intended use of the resulting technology is in future products to be marketed by both companies; a substantial fraction of the U.S. production volume will be exported.

The technical challenge of the next generation of packaging technology is greater than that of the first generation. This new generation is positively needed if the previously mentioned reduction of propagation distance (resulting, as explained, in improved performance of the larger information-processing system) is to be achieved. Large investments will be required.

In order to maintain competition in the information-processing industry, it is necessary that the industry in general rise to the challenge. It is noteworthy that Japanese manufacturers are extremely active in this field and have demonstrated impressive technical ingenuity.

Because of the large investment (in development cost), the ability of the U.S. company to remain competitive in the second generation of packaging technology (middle to late 1980's) could be seriously impaired if the cross-licensing agreements between the U.S. company and its foreign subsidiary were rendered ineffective—for example, by unduly onerous U.S. Government restrictions on the flow of technological information from the United States to other Western countries or Western governments' restrictions on the flow of technological information from abroad to the United States. Uncertainty as to the future technology transfer policies of the various governmens could have an adverse effect on the willingness of companies in positions similar to that explained above to make a timely start on an expensive program of innovation, while a giant company with large internal resources or a Japanese company with possible access to government subsidy might not hesitate. A clear statement of the intent to continue to permit technology transfer for purely commercial applications between U.S. companies and their Western subsidiaries and affiliates would further competition within the U.S. marketplace and would tend to make American products more competitive in the world market.

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8. The Post Office quoted an estimate of 10,000 to 150,000 pounds as the charge to evaluate our ACD to meet their standards.

9. It was not surprising that the BPO Marketing Manager was willing to state that their purpose is to "control rate of entry into market."

/s/H. Hensley

ATTACHMENT B

It is common in many developed countries to have standards of product safety or performance, in some degree like the UL (Underwriters Laboratory) standard. Compliance with these standards may be required by law, local or federal, or for insurance purposes, or may be expected by the consumer as a matter of common practice. Often such foreign standards are more severe in their requirements and more pervasive in their application than they would be in the U.S. Finally, each of the many foreign countries has requirements that are likely to be different.

The experience of one company, a supplier of video-display computer terminals, is representative of the problems that have been described by other domestic firms whose business is supplying electronic products for the industrial market. The company is represented by subsidiaries in Germany and Britain and by distributors throughout all of Europe. Notwithstanding this local contact, the need to provide equipment to meet various standards was, at first, a reaction to specific customer requests.

In most instances, it was necessary to learn what was necessary to meet customers requirements from various sources, often conflicting. Often, because the required configuration was not available off-the-shelf, the sale would be lost. Other times, approval was requested as best we understood the requirement, while shipments were made pending approval. Because of the lack of familiarity of what was required, the products often failed the approval, so that the design had to be modified and equipment already delivered had to be retrofitted at considerable expense. In one instance, a new product was designed to be consistent with other products so that it could be expected to meet standards as they were understood, only to have the equipment fail to be approved because of the lack of understanding and ability to relate the standard to the required design implementation. Again, costly redesign and schedule delays were encountered. Finally, it was learned that there were governmental regulations for compliance which could prevent the use of all unapproved equipment that was already installed, and could place company management at risk of legal action for being negligent.

Efforts to learn of the requirements from some centralized source within the U.S. such as industry associations like EIA or professional organizations such as ASQS, were fruitless. Ultimately, face-to-face meetings with legal authorities and personnel responsible for standards activities were required to be assured that actions were taken as required and that all relevant standards were identified and understood. The results of this effort were only applicable to sales in one country. Requirements to date are not as stringent in other European countries and to some degree the cycle may be repeating in those countries where action is being taken as a matter of expediency, but in a manner which is acceptable at this time. It is understood and can be expected, however, that the more stringent requirements for compliance will be instituted in the future in other countries.

ATTACHMENT C

Excerpted from a letter by H. O. Blair, Vice President, Patents and Licensing, Itek Corporation, to the Members of the Patent Committee dated October 27, 1978.

II. Information From Foreign Patents

When I visited the Committee on Inventions and Discoveries of the Soviet Union in 1971, I spent some time with an organization which the Soviet's refer to as

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prohibits the acquisition of foreign technology by small companies which do not have the experience or cannot afford the expense of operating in such an environment. On the other hand, recent U.S. controls on technology exports requiring 100 percent White House review[10] will, at least, slow the approval process further, and will likely create more situations where the decisions for approval are based on political factors rather than those related to national security or economics. It is particularly detrimental to U.S. industry when the same technology denied by the United States is supplied from other countries. The net result is a disincentive to U.S. innovation and stimulation of foreign innovation.

In recent years, there has been a number of meetings under the auspices of the United Nations Conference for Trade and Development (UNCTAD) in an attempt to prepare a Code of Conduct to be used in international technology transfer. In effect, the Code of Conduct would cover a wide variety of transfer of technology situations between parties when the technology transfer occurs across national boundaries as well as domestic technology transfer when one of the parties is controlled by a foreign entity. An issue that has not yet been resolved is whether the code would cover agreements between a parent in one country and a subsidiary in another country. Still to be determined in the negotiations is whether the Code of Conduct will be "voluntary" or mandatory. (However, even if a "voluntary" code is instituted, government agencies as well as some courts in many countries may give it a significant amount of credence and may use it as criteria on which to measure the appropriateness and reasonableness of technology transfer agreements.) If such a code is promulgated, there will be even less international technology transfer by small companies and individuals, and the technology transfer by larger organizations will probably be significantly lessened because of the incentive reduction.

At the same time the U.S. Government must review its policies that restrict the flow or use in the United States of certain types of information developed abroad, directly or indirectly.

As one example, the U.S. Treasury Department has proposed the imposition of extra custom duties (under 19 U.S.C. 1303) on products developed by multinationals outside of the U.S. using research and development grants from local governments. (Refer attachment D.)

In addition to the constraints to the use of such technology, this practice is also likely to result in those local governments imposing like import barriers on U.S. products developed under U.S. research and development grants.

As another example, there are uncertainties as to U.S. policy relating to cross-licensing agreements between U.S. companies and foreign subsidiaries or affiliates. (Refer attachment E.)

[10] "Electronic News, Oct. 30, 1978, p. 4.

Such agreements if rendered ineffective, for example by unduly onerous U.S. Government restrictions on the flow of technological information from the United States to other Western countries or by Western governments' restrictions on the flow of technological information from abroad to the United States, can have an adverse effect on the willingness of companies to collaborate in situations where substantial investment in technology is necessary to maintain the competitive position of U.S. products.

The situation is similar where foreign governments are restricting transborder data flow by laws ostensibly dealing with the privacy, security, and confidentiality of information flowing across national boundaries. Application, interpretation, and enforcement of these laws may actually cut off the flow of information which is vital to the United States and to the far flung activities of multinational corporations.[11] Eighteen nations now have privacy or other so-called "data protection" laws on the books or in the making to restrict the flow of information in the name of privacy.

The obstacles to the flow of information are not limited to national privacy or data protection laws alone. For example, the European Ministries of Posts, Telephones, and Telegraphs (PTT's), the government-controlled monopolies, now price their facilities at rates that are prohibitive for the development of private user-controlled networks. In other forms, new proposals have been put forth which threaten elimination of private lines altogether and protocols (or standards) have been suggested which likewise threaten to wrest the control of international data processing away from the user completely. These laws present a threat to the free flow of both marketing and technical information which is vital to the United States, to multinational corporations, and all others transacting business and exchanging such information across national borders.

RECOMMENDATIONS

The U.S. Government should encourage international technology transfer by:

- Pursuing negotiations within various international bodies such as UNCTAD, OECD, and the U.N.,
- resisting restrictive regulations on international technology transfer by individual foreign countries or international agencies,
- clearly stating the intent to continue to permit technology transfer for commercial application by cross-licensing agreements between U.S. companies and their Western subsidiaries and affiliates.

The U.S. Government should prevent the imposition of countervailing duties by the U.S. Treasury Department on products benefiting from foreign government R. & D. subsidies.

The U.S. Government should complete negotiations on a meaningful international Code of Conduct on technical barriers as part of the ongoing multilateral trade negotiations.

[11] John Egar, "Transborder Data Flow," Datamation, November 1978.

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management problems, and the management problems were largely related to marketing.[6] The influence of these factors is particularly significant as it relates to the foreign trade of companies seeking entry to this market.

There appears to be an overwhelming amount of information available from the U.S. Government (especially, the Department of Commerce as part of a program focusing on foreign market opportunities for U.S. suppliers) in the form of foreign country market surveys and specialized efforts targeted to specific industrial product areas. However, the existence of such information is either unknown to or the information does not adequately serve the needs of smaller businesses and is largely ignored by them. The information is often too general or is incomplete with regard to those details of interest. It fails to identify and qualify trade and technology opportunities in a timely manner. It fails to deal effectively with barriers that have insulated business from foreign markets.

> As an example, a Department of Commerce survey, *The German Market for Computers and Peripheral Equipment,* was of little benefit to one company concerned with marketing a particular type of peripheral equipment. Also, information regarding special technical requirements necessary to meet German governmental regulations was of little benefit to one company concerned with marketing a particular type of peripheral equipment. Further, information regarding special technical requirements necessary to meet German governmental regulations was of little value.

Foreign governmental regulations, technical standards, and requirements for product certification largely serve to discriminate against U.S. products, especially those high-technology type products likely to be offered by innovative, small business enterprises.[7] Often such foreign standards are more stringent in their requirements and more pervasive in their application than they would be in the United States. Compliance with such standards may be required by law or for insurance purposes, or it may be expected by the foreign customer as a matter of practice. Furthermore, some countries are less willing than others to divulge information about these requirements. Finally, each of the many foreign countries has requirements that are more than likely different from the others. A *Fortune Magazine* article of November 20, 1978,[8] dealing specifically with trade with Japan, gives considerable treatment to the problem created there by the lack of knowledge by U.S. businessmen of the standards and the methods required to demonstrate conformance. (For other examples provided by members of the Advisory Committee, see attachements A and B.)

Information relating to existing standards and regulations imposed by foreign governments is generally known to larger business firms in the United States, especially those already engaged in export trade. However, a problem experienced by these firms, as well as by smaller businesses, is the need to maintain an awareness of changes in those standards and regulations. As an example of the problem, the *Fortune* article referred to above describes a situation whereby valuable marketing intelligence regarding the impact of a new Japanese Government regulation was only learned from a chance encounter. On the other hand, Japanese companies are easily able to keep systematic taps on regulatory changes in the United States.

It is recognized that much of the information relating to markets, standards etc., can best be acquired by the U.S. Government because of the scope and nature of what is required. The efforts underway at the Department of Commerce to develop overseas trade and marketing through the Worldwide Information and Trade System (WITS) are demonstrative. Allowing the participation of industry representatives to influence this system in the definition of data required, implementation means and subsequent continuing evaluation and feedback of the utilization of the system would enhance its usefulness.

RECOMMENDATIONS

The Government (Department of Commerce in particular), with the inputs of the business sector, should improve techniques for defining, developing and disseminating information about trade opportunities for the business communities seeking entry into foreign markets. The information must be of the type and in sufficient detail to benefit smaller businesses. Generally, it is the type of information already available to (or that which could be acquired by) the scientific and commercial attaches abroad, and pertains to foreign technology, patents, product conventions, regulations and market opportunities. The availability of such information must be made more widely known and it must be more accessible. It must be specific, timely and sensitive to trends.

The Government should support legislative efforts (such as the Roth-Ribicoff Bill) with the objective of improving the quality of information and its objectivity with regard to economic and trade data by staffing our overseas government commercial facilities with more qualified commercial officers. Staffs should be administratively separated from Embassy functions preferably under the separate authority of trade commissioners.

The Government should make arrangements to collect information relating to existing or anticipated standards and requirements necessary to obtain product approval and certification for the use of such products in each foreign country and to ensure its availability to U.S. companies.

II. Expand And Rationalize The Collection And Distribution Of Foreign Technical Information

Technology and specialized know-how is a primary tool of trade development for many maufacturers whose existing products cannot compete in foreign markets or who desire access to overseas technology as a

[6] Arthur H. Wulfsberg, "Measuring Risk is an Important Step in Launching Innovative Products," IEEE, SPECTRUM, Oct. 1978.

[7] "Foreign Barriers Against U.S. Exports," Electronics and International Competition, Electronic Industries Association, 1978, pp. 95–99.

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The searching system—whether bibliographic or full-text—only represents one-half of the requirement for effective retrieval. The second is the classification and indexing scheme necessary to identify and retrieve all relevant patents, not merely the obvious ones. It should be possible, for example, to approach an automated search and retrieval system on a technological basis rather than attacking the massive problem with a single comprehensive method. It should be possible to interface individual technologies one with the other through thesauri to increase the possibility of complete and correct classification and reduce the chance of missing a valuable piece of information. Most important, it should be possible to design the system so that one can search by *concept*.

A number of commercial organizations and professional societies have already approached the development of specific classification and search schemes for their particular technologies; for example, the ITPIS System (Image Technology Patent Information System) developed by the photographic industry. The Patent Office should undertake to develop a master or umbrella classification and cross-referencing scheme which provides the interfacing of the various individual technologies.

The Patent Office itself should develop its information resources to fulfill its mission in partnership with the private sector.[1] For example, other firms and scientific societies are already developing and disseminating information about patents. Generally speaking, persons within a given industry or at the information companies that service those industries would know best what shortcomings exist. Many of the more obvious needs have already been filled. However, the Patent Office can help identify voids in patent information and encourage other private organizations to develop information in areas that are not being served by existing services.

RECOMMENDATIONS

The Patent Office should undertake at the earliest possible date to complete the development of an effective computer based search and retrieval system so as to improve the value and effectiveness of issued patents.[2]

The Patent Office should support the development of appropriate classification and indexing schemes and provide an umbrella under which to integrate the systems for the various technologies.

The Patent Office should encourage the development of user oriented patent data bases in specific areas by organizations that would be most responsive to user needs. To achieve this innovation in private patent information services, the PTO must clarify the present and potential role of the Patent Office in patent dissemination.

[1] For further discussion, see section on Government as a Creator and Distributor of Information.

[2] In view of the expense and the delays in implementation that would be incurred if the computerized system were to initially embrace all patents now on file, the Subcommittee's recommendation is to begin with the current files and when and as feasible include retrospective information. The Subcommittee embraces within this recommendation the efforts already undertaken by PTO and strongly urges that these efforts be continued within full consideration given to systems that already exist within the private sector.

II. The Relevance Of The Patent Document To Innovation

It is recognized that a patent is a legal document which must be written to provide protection to the inventor and to define the scope of the invention. Much of the information innovators require is already available in the patent document itself, and there is a current requirement for an abstract. However, the information is scattered, not well-organized for retrieval purposes and the current abstracts lack consistency and completeness. As stated, one of the most significant uses of patent information in the innovative process is to enhance the willingness of innovators to take risks with new inventions. Innovators often look to the patent document for a sense of assurance concerning the usefulness of the invention or for technologies appropriate to their needs. The Patent Office, through its own directives can require that an additional submission—or cover page—accompany the patent. The new cover page would *not* become part of the legal document itself. However, it would enhance the patent document as an information resource. Simultaneously, with the introduction of this cover page, an automated system should be available to search the information it contains.

This cover page should furnish:

- A more descriptive title;
- Descriptive terms which are provided for the search and retrieval system;
- A statement of what need is met or what problem is solved, including a description of what is useful and in what product or problem areas it might apply;
- An improved summary which provides adequate disclosure of the generic basis of the invention and a clearer description of what the new invention is about.

The value of the patent as an information resource would also be enhanced if simple, nondescriptive lists of products and services commercially delivered and in which the patent had been used were provided by the patent owner or licensee on an annual basis.[3] (The case of the licensee should be studied so that he would be responsible for such disclosure without endangering the rights of the owner licensor.)

At the very least, the PTO's present abstract preparation guidelines should be reviewed with the intent of improving them (per the Subcommittee's statement of needs) and a compliance program should be implemented. By providing for more comprehensive classifications and clearer directions on submitting nontechnical information, the usefulness of abstracts for innovation would be expanded.

RECOMMENDATION

The Patent Office should develop and require the submission with the patent application of an informa-

[3] The Subcommittee member who prepared this modification suggested that such an annual submission be *required* for owners to retain their patent rights.

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V. Accessing Multiple Data Bases

The rapid expansion in the number of data bases has been accompanied by an almost equally rapid expansion of the number of retrieval systems. One literally lives in a Tower of Babel when faced with the profusion of command languages, protocols and systems responses (not to mention terminals, keyboards, etc.). Moreover, the data bases themselves differ considerably by subject, source, format, data elements included, and indexing and vocabulary practices.[1] While information utilities help to reduce the confusion, the growth of private networks acts as a counterbalance.

Industrial information companies cannot undertake to develop common protocols, performance standards, etc., or, except for training people in the use of their own systems, to develop broader understanding of how to use information effectively as well as where to find it. Numerous studies have reported experiments to deal with the "proliferation" problem but no practical solution have yet emerged. Research is needed to find the means to cost-effectively provide the linkage between systems, to make retrieval easier and, thereby, make the data bases more user oriented.

VI. Assistance to Users

In looking at how users of information can be assisted to improve their knowledge of and enhance their access to information of value to innovation, a number of areas were examined by the Subcommittee. Among them were:

- An information extension service, not unlike the agricultural extension service;
- Regional information centers which would bring information closer to the small business innovator;
- Development of education programs for users;
- Development of training programs and curricula in innovation.

The evidence presented in these discussions did not always convince the Subcommittee that in this area significant changes in government policies or programs could further innovation.

There is a recognized need for education and training programs to increase the capabilities of the professional work force to understand and apply existing information resources to their research and problem solving activities. There is also a need for development of curricula at professional schools of library and information sciences to improve the understanding of user needs and for curricula at graduate (professional) schools and colleges to train potential information users.

However, in the area of educational assistance, the Subcommittee was most impressed by evolving programs to train innovators. In the National Science Foundation's innovation center experiments, a number of universities were designated as innovation centers for selection and training of technological entrepreneurs. The results have been the establishment of promising new businesses. While it is difficult to predict the long range success of this program and its efficiency in identifying and training those few innovators who may truly break new ground, the short range result is real and measurable. It is a program that should be studied and supported with the intent of expanding and applying the findings to other institutions in a wide geographic area.[2]

VII. Communication As Amplification Of Information

Many students of the R. & D. process have discussed the central role of person-to-person information transfer. Aside from face-to-face meetings, the telephone and television have brought people together who are, literally, oceans apart. Increasingly, the newer communications modes—especially computers—are linking people and ideas.

It has also been observed that the value of the information system itself is greatly enhanced through direct personal interchange between the users and the creators, the organizers or the experts in the field. Furthermore, individual users have shown a genuine interest in communicating with each other when they are free of competitive conditioning.

In spite of the above, little has been done so far to encourage user participation in information systems design, maintenance and operation. It is necessary to begin conceiving information systems as sophisticated interactive systems with a growing communications emphasis in addition to their pure broadcasting capability.

At the same time, there is considerable fuzziness in Federal communications policy relative to private networks, point-to-point computer communications, etc. In fact, regulations prohibit the use of information networks for communications versus merely data entry and retrieval.

Failure to recognize these developments and modify the laws and regulations to reflect these technological changes results in confusing charges, services, contract requirements, etc., hitting particularly hard at the small business developer of data bases and data base services.

The small business in information publishing is reluctant to invest heavy sums in new product development in view of the uncertainty of the ability to economically tie in to a communications network and the lack, so far, of adequate competition to push down the cost of communications as technology advances.

RECOMMENDATIONS

The Government should support research and development efforts which can lead to solutions to the technological and economic problems that are inhibit-

[1] Martha E. Williams, On-Line Information Meeting, London, December 13–15, 1977.

[2] See Industrial Program NSF Volume 2, Number 6, Sept. 1978, "Intergovernmental Science and Public Technological Publication;" Engineering Education, Nov. 1978, "Technological Innovation through Entrepreneurship;" Horizon USA, Number 19, "Innovation Centers, Turning Ideas into Reality;" and Industrial Research Flash Development, April 1978, "Education for Invention."

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and societal lives. However, it limited its consideration to the *linkage* of information and innovation.

Similarly, the Subcommittee excluded from consideration innovation-related information requirements which do not involve Government.

2. Fundamental to these premises, of course, was an underlying assumption concerning the roles of business and Government in this country; namely, reliance on the private enterprise system in business affairs and on a pluralistic system of government in public affairs.

3. The problem was addressed from a business point of view and from the businessman's experience.

Based upon members' experience, the public literature, and discussions with producers and users of information within and outside the Government, the Subcommittee systematically placed on the table *all* the identifiable issues of information as it affects innovation.

After identifying the array of issues, the Subcommittee concentrated on those that its members concluded were in fact relevant to innovation and where indeed the Government could influence the generation, availability and use of information. Excluded were those which in the consensus judgment did not fit the stated criteria. Thus, the report is not a menu of recommendations; it is not a smorgasbord of possibilities. It represents those issues and those recommendations that the Subcommittee in its collective opinion, considered to be most germaine to the subject at hand.

IV. Information Issue Areas

The Subcommittee's recommendations are specific in terms of policy but not detailed in terms of implementation. For example, while the Subcommittee addresses the need for a more useful classification of patent information, it does not attempt to establish the technical parameters for such a classification scheme.

Six areas were studied in some depth after reviewing a much broader scope of actual or potential Government involvement:

- Meeting User Needs
- Patents as a Source of Information
- Foreign Market and Technical Information
- Regulatory Impediments
- Protection of Data Bases and Software
- Government as a Creator and Distributor of Information.

The sections that follow explore the issues and the reasoning behind each of the Subcommittee's recommendations.

MEETING USER NEEDS

Introduction

"Information" as a descriptive term often is used synonymously with knowledge. In that sense it is a generic, global term which obscures the interaction of organized pieces of knowledge—which is what information really is—and the processes of invention and innovation. However information can be disaggregated in several ways.

- Information for the scientist is of a different order of magnitude and diversity from information for the technologist which, in turn, is different from information for the innovator.
- Viewed from another perspective, the information needs for the inventor are different from the information needs of the entrepreneur and from those of the financier.
- Information requirements vary by industry, by technology, and by discipline.
- Similarly, one can distinguish between information affecting the ability to innovate and that affecting the willingness to innovate.

To attempt to create a matrix intersecting these classification schemes and then to assess Government's role may be useful, indeed exceedingly valuable, but it is beyond the scope of this report.

I. In The Beginning

Innovation is sparked by an idea, a stroke of genius, a flash of insight, a hunch, intuition or just plain gut-feel. Despite a multitude of studies, there is little hard evidence as to what motivates innovators and inventors and whether, or how, information itself stimulates these motivations. Flashes of insight or genius can be triggered by a chance brush with a piece of information or the confluence at a point in time of several seemingly unrelated bits of information. The prospect of increasing the chances of serendipity by stoking the information flow to creative people is an interesting challenge. It has been suggested, for example, that increasing a scientists's ability to browse or making possible a greater degree of personal interaction with others in a similar or related field of interest might improve the probabilities of serendipitous invention. However, from the Subcommittee's perspective, it would appear more desirable to assure an information flow that helps innovators to articulate concepts, to test hypotheses, and to solve problems. This information flow must be organized, whether it is mechanized or personalized.

II. Where is the Information?

For information to be valuable to the innovative process, its existence must first be known.

Both the Government and the private sector offer a wide range of information products and services that have considerable value for innovation. It was readily apparent to the Subcommittee that the problem is not lack of sufficient information resources but lack of knowledge about those that do exist. Much time, effort, and money have been spent (often in vain) to locate the information center, clearinghouse or resource with-

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SUMMARY OF PRINCIPAL RECOMMENDATIONS

The principal recommendations on information policy developed with the Report on Information Policy submitted by the Subcommittee on Patent and Information Policy are summarized below. The recommendations are grouped into major issue areas which the Subcommittee identified as relevant to its assignment.

The Subcommittee also prepared supplemental recommendations in each issue area which it believes are worth of consideration and implementation.

Both the principal and the supplemental recommendations are discussed in detail in the body of the report.

MEETING USER NEEDS

The Government should encourage establishment and development of combined electronic information and communications systems by the private sector, including small businesses. It should resolve as quickly as possible the confusion of this increasingly important area through adequate legislation.

PATENTS AS A SOURCE OF INFORMATION

The Patent Office should complete the development of an effective computer-based search and retrieval system for its own use and for public access, and should support the development of appropriate classification and indexing schemes in order to integrate the systems for the various technologies.

The Patent Office should develop specifications for and require the submission of supplemental information to help make accessing easier and more complete, and to provide more information concerning a patent's use and potential applications.

FOREIGN MARKET AND TECHNICAL INFORMATION

The U.S. Government should improve techniques for defining, developing and disseminating information about trade opportunities for the business communities seeking entry into foreign markets. It should make arrangements for foreign countries to provide the United States with information on standards and product approval requirements. Especially, it should encourage international technology transfer through negotiations with various international bodies; by resisting restrictive regulations by foreign countries or international agencies; and by clearly stating its intent to continue to permit such transfers for commercial applications. Further, it should encourage and help make possible the systematic collection and distribution of foreign patents and other technical information.

The U.S. Government should prevent the imposition of countervailing duties by the U.S. Treasury Department on products developed by multinations outside the U.S. benefiting from R. & D. subsidies of the foreign government.

REGULATORY IMPEDIMENTS

Government should establish and enforce a consistent policy for interpretation of the Freedom of Information Act to make clear that information which is classified as described in subsection 552(b)(4) of the act shall not be released under the act.

PROTECTION OF DATA BASES AND SOFTWARE

The CONTU recommendations relative to copyright of software and data bases should be implemented.

GOVERNMENT AS A CREATOR AND DISTRIBUTOR OF INFORMATION

Government should establish a policy that, except for confidential and classified materials, all information created and collected by the Government should be made conveniently accessible at incremental costs to help widen its distribution and use.

A more productive Government-industry relationship should be established by policy directive whereby the Government will refrain from entering into competition with existing services without a clear demonstration of public need and will work with the private sector to help fill information gaps.

OVERVIEW ON INFORMATION POLICY

The importance of information as a powerful force in innovation is obvious. If knowledge provides the basis for invention and innovation, and if information is knowledge communicated, then it follows that information about processes, science, technology, markets, etc., is the stimulant for innovation.

One of the principal roles of Government in this age of electronics, computers, and space exploration has been to help tap, directly and with the aid of the private sector, the reservoir of scientific and technical information available worldwide and deliver it to scientists, innovators and entrepreneurs.

There are few complaints that information does not exist. Indeed, it exists in profusion and is increasing at an exponential rate. New data are created to fill a knowledge gap or they flow as a byproduct of some other activity. There is nothing, the Subcommittee concluded, that Government can or should do to spur the creation of additional information per se. (In this respect, its role in the innovation process is achieved through the stimulation of research and development, especially basic research from which new and novel information can flow. The issue of Government and research and development is addressed by another Subcommittee.)

It would appear, therefore, that the information imperative is not the generation of more data, documents and literature (the raw materials of information), but rather the communication of information, its accessibility and feedback; in short, to see that the relevant knowledge is available to inventors and innovators when they need it, where they need it and in the form

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imitation, not innovation. The companies have become collaborators rather than competitors. The Government, in setting minimum performance standards, has found that the industry thinks of them as absolute targets and seems to feel little or no incentive to try to gain an edge by exceeding those requirements." The auto industry has engaged in cooperation to protect the status quo. Given the record of big business, it seems to us that cooperation is just as likely to impede innovation as to promote it.

MERGERS

The Industry Subcommittee has taken two conflicting positions on the subject of mergers. On the one hand, they say they are concerned that the cost of environmental, health, and safety regulations is beyond the means of small businesses, forcing them to close or merge with larger firms. Similarly, they say that larger firms are becoming larger through mergers and integrating vertically to offset the cost of regulation. In that context, they appear to view the trend to increased concentration with alarm. On the other hand, they rejected moves to limit mergers, saying that it is through mergers with larger units that small, advanced technology-based businesses reach their greatest economic potential.

The increase in mergers and the heightened concentration in American industry has been going on for years; it certainly was underway long before the recent increase in government regulations. The first wave of conglomerate mergers swept the country between 1962 and 1969, during which time more than 100 of the Fortune 500 largest industrial corporations disappeared by merger. Today we are experiencing a renewal of the merger trend, but it has not reached its former heights. In 1977, there were about 1,700 mergers, nowhere near the 1969 peak of 4,900. It is unreasonable to claim that environmental, health, and safety regulations are forcing companies to merge, when the bulk of the mergers preceded the existence of most of the regulations.

Nor do we see the society as necessarily benefiting from increased innovation or even increased dissemination of innovation when small innovative companies are merged into giant conglomerates. As Senator Edward Kennedy pointed out during hearings on conglomerate mergers in July, 1978, "The history of our society is replete with the dangers of absentee ownership. The current trend towards conglomerate mergers raises again that danger in a new and very troubling way. Independent owners of local businesses become Division Managers for distant conglomerates, losing their ability to make independent decisions, or to try new or innovative approaches, without approval."

He also pointed out that "conglomerate mergers inevitably result in larger and larger enterprises, more and more removed from the shareholders, consumers, employees, and communities which depend on them." The Public Interest Subcommittee sees increased merger activity as a serious threat to both the rate and the direction of innovation.

ALTERNATIVE RECOMMENDATIONS

The Public Interest Subcommittee has made several recommendations regarding the structure of industry and promotion of competition in its own report. They speak primarily to the preservation and assistance of small business and the creation of business institutions to foster innovation responsive to the needs of society. Those recommendations bear repeating here as an alternative to the recommendations of the Industry Subcommittee. They are:

(1) Existing antitrust laws should be vigorously enforced and the concept of antitrust should be expanded to cover the adverse effects of conglomerates and financial interlocks.

(2) The concept of Federal chartering of giant corporations should be further developed and implemented as a means for providing an institutional framework both conductive to innovation and responsive to the needs of society.

(3) State-level product development corporations should be assisted and encouraged as a means to provide commercialization capital to small businesses and to types of innovations for which traditional sources of money are difficult to tap.

(4) Federal-State extension services should be established to help small businesses to gain access to technology, to inform consumers of available technology in areas of special need, to communicate the special needs of small businesses and consumers to inventors and engineers, and to foster development of technology suitable to small scale operations.

(5) Where it can be shown that regulations actually place an undue burden on small businesses, the Federal Government should provide grants and coordination assistance for the purpose of developing compliance technology of the appropriate scale.

PRICE AND ENTRY REGULATION

Finally, there is one area in which the Public Interest Subcommittee is in substantial agreement with the Industry Subcommittee. We support the removal of government price and entry controls on products or services in competitive markets. We would eliminate such controls with caution, however. The impact of such deregulation should be carefully assessed so that undue burdens do not fall on a limited number of workers, firms, and communities.

SUMMARY

The Public Interest Subcommittee views business concentration as inimical to innovation. Study after study has shown that the largest share of industrial innovation has come from individuals and small businesses rather than large corporations. Smaller enterprises have the flexibility to perceive and act upon opportunities for innovation based on society's needs. In the face of this evidence, attempts to foster innovation through a relaxation of antitrust enforcement are a contradiction in terms. The assurance of a vigorous, competitive structure of industry is a prerequisite for innovation and a critical role for Government.

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most—of these acquirors are international giants, notwithstanding their previously limited American presence in the fields of acquisition. Their American acquisitions have unquestionably increased their relative strength worldwide, particularly where the acquisitions afford them access to new technology and innovative capability. If the result is a long-term shift in the international competitive balance, the ultimate consequences may prove detrimental both to competition in the American market and to the strength of the American economy. Again, this is not to say that such acquisitions and their accompanying consequences are inherently undesirable. But the consequences of affirmatively encouraging this phenomenon by eliminating American firms as potential acquirors need far more careful consideration on a case-by-case basis than is now permitted under section 7.

4. Antitrust enforcement, while indisputably a cornerstone of American economic policy, must be considered as one aspect of Federal economic policy as a whole, and not as an end in itself. While most antitrust violations present no genuine policy tradeoffs, many important enforcement policies and activities do, as exemplified by several of the recommendations concerning the impacts of enforcement activities upon innovation. Such tradeoffs should be fully considered within the enforcement agencies themselves, in regular consultation with other Federal departments and agencies. If the enforcement agencies regard considerations of general economic policy as beyond their mission, then an interagency committee should be established to assure a sensible consistency between antitrust enforcement policies and overall national economic goals.

Discussion.—In many respects, this is the Subcommittee's most important recommendation. It recognizes that there may exist what one report has called "areas of possible conflict" between antitrust policies and other economic objectives, innovation in particular.[30] While the thrust of antitrust policy as a whole is unquestionably proinnovative,[31] this REPORT has already referred to several specific areas in which the interpretation and application of antitrust laws may produce unintended adverse effects upon the innovative process. To the extent that these occur, it is, of course, highly desirable that explicit policy tradeoffs be made. Without diluting the vigor of antitrust enforcement, it may be appropriate in certain cases to give special consideration to the requirements of other economic objectives, such as industrial innovation.

Ideally, tradeoff decisions should be made within the antitrust enforcement agencies themselves. If, however, those decisions are to be well informed and reasonably consistent with other economic policies, then an intensive and continuing process of consultation between the enforcement agencies and other information and policy centers within the executive branch must occur.

Upon occasion representatives of the enforcement agencies have expressed the view that their function is simply to enforce the law, not to make economic policy; and that policy issues arising out of the application of the antitrust laws should therefore be addressed to the Congress. The Subcommittee believes that this view is inaccurate and shortsighted: that the enforcement agencies, by their actions, affect American economic performance; and that recourse to the Congress, on a recurring basis, is obviously impracticable. If the enforcement agencies are unprepared to consider issues of economic policy as part of their mission, then some form of interagency machinery is required.[32]

Not only must antitrust policy be reconciled on a continuing basis with national economic policy, but the basis for that reconciliation must be clearly articulated to the business community. To many business executives, the areas of apparent conflict between antitrust policy and overall economic policy may appear to be larger than the facts would justify. But business decisions are based upon those appearances, and the nature of the innovative process renders it particularly susceptible to the chilling effects of adverse or uncertain policies.[33]

American industry will innovate and compete more aggressively (and more successfully) if it is first able to understand what is expected of it. That understanding can only derive from the articulation of reasonably clear antitrust policies which are generally consistent with coherent national economic objectives.

[30] *Technological Innovation: Its Environment and Management,* Department of Commerce (1967), p. 49

[31] See, *e.g., Domestic Policy Review of Industrial Innovation,* Baruch (November 17, 1978); *The Relationship Between FTC Activities and Private Sector Technological Growth,* Memorandum from J. C. Hilke and C. B. Goldfarb to J. Baruch (October 16, 1978); *Antitrust Involvement: A Positive Force for Innovation,* Remarks by K. P. Ewing, Jr., before the IEEE (September 20, 1978).

[32] This was also a recommendation of the Charpie Report in 1976. See *Technological Innovation: Its Environment and Management, supra,* Recommendation 13, at p. 54.

[33] For a discussion of the effects of uncertainty on investment in innovation see S. Buchanan, supra, at pp. 14–15.

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quickly enough and in sufficient amounts, and if the firm is successful in developing or acquiring the entirely new and different set of skills it will need to manage its growth,[20] then it may succeed in establishing a permanent position in the marketplace. From a competitive perspective, this is, of course, the most clearly desirable outcome; however, it is also the most hazardous, and that fact should be recognized by the enforcement agencies and the courts in dealing with section 7 cases.

(b) The firm may be acquired by a larger firm which does not already participate in the market to which the innovation is addressed. This course may provide the access to capital and management skills more rapidly than would be the case under the first alternative. To the extent that this process occurs, again a new entrant has appeared, with procompetitive effects. The ability, however, of the acquiring firm to compete successfully in what is, for it, a new market, may or may not prove adequate; and uncertainty in that regard may deter potential acquirors.

(c) The firm may be acquired by a firm which already has a position in the market to which the innovation is addressed, or in a closely related field (i.e., a "potential competitor"). The current policies of the enforcement agencies are opposed to such acquisitions.[21] In some cases, however, this type of acquisition promises the most rapid implementation of the acquired firm's innovation, as well as the highest and safest payoff for the original entrepreneurs.

Each of these alternatives may be a realistic possibility for a small firm, and it is generally only the third which is subject to antitrust challenge. The first two are ordinarily to be preferred—*if* they are genuinely feasible in a particular case. But it should not be presumed that such alternatives are invariably realistic in all cases. In particular, data related to the availability of public or private funding cast serious doubt upon the feasibility of the first option in most cases.[22] If, however, antitrust policy precludes the possibility of acquisition by actual competitors or potential entrants in cases in which the first two alternatives are in fact unrealistic, then the result is likely to be both anti-innovative and anticompetitive. In such cases the firm may have to struggle on without adequate capital or management, and ultimately die; or, alternatively, it may be forced into an unsuitable merger, with the same result. The broadscale implementation of the innovation will be delayed in such cases until it becomes adopted by some other firms; and the final result will then be little different from permitting "horizontal" acquisition in the first place.

[20] Many firms fail at this point not because of lack of fund availability but because the original inventors and entrepreneurs do not possess (or recognize the need for) the management skills necessary in this phase. See *Technical Innovation: Its Environment and Management, supra,* at p. 23.

[21] See, *e.g.,* Interview with J. H. Shenefield, *Los Angeles Times,* November 19, 1978; J. F. Brodley, *Potential Competition Mergers: A Structural Synthesis,* 87 Yale L. J. 1,6 (1977).

[22] "Given these problems in acquiring venture capital today, it is remarkable that any new companies have been started and financed in the last 3 years." *The Role of New Technical Enterprises in the U.S. Economy, supra,* at p. 11.

Issue No. 7

The American market has increasingly become part of an international market. This development profoundly affects the interests of Americans both as producers and consumers. Antitrust policies have been slow to recognize the extent and significance of this development, and particularly the relative erosion of American technical and cost leadership.

General Recommendation

The Administration and the Congress should carefully consider the extent to which existing antitrust policies require redefinition in view of the extent and direction of international competitive trends.

Discussion.—Every available economic and technical indicator confirms the widely shared perception that the relative position of American industrial technology has substantially eroded in recent years.[23] Since antitrust policies must be based upon the nature of competition (and threats to competition) in the real world, the concurrent trends toward the internationalization of competition and the relative deterioration of America's competitive position are facts of paramount importance for antitrust policy.

Some efforts have been made by both the Congress [24] and the antitrust enforcement agencies [25] to respond. While these efforts are clearly constructive, they are at best tentative and preliminary. The rapidity and apparent irreversibility of these trends requires a far more urgent and thoroughgoing response.

Specific Recommendations

1. The Administration should initiate an intensive study, to be completed within 1 year, to determine (a) the extent to which foreign firms engage in practices which would, if subject to American jurisdiction, violate the fundamental principles of the Sherman Act (e.g., market division, concerted strategies, use of monopoly power to shelter domestic markets, etc.); and (b) the extent to which such practices in fact afford such firms competitive advantages over their American competitors. If the findings of this study indicate that such practices are widespread and competitively significant, the Administration should recommend appropriate remedial legislation to the Congress. Such legislation might provide for (i) protection of the American market from incursions of the products of such firms; or (ii) amendments to the antitrust laws to place American firms on a more nearly equal footing; or (iii) an explicit policy determination to take no action.

Discussion.—The present state of information does not permit confident assessment of either the extent to which the bedrock principles of the Sherman Act are

[24] See *e.g.,* R. Gilpin, *supra.: Government Involvement in the Innova- Competitiveness,* Subcommittee on Economic Growth of the Joint Economic Committee, U.S. Congress (1975).

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existence is most important. For example, some evidence suggests that leading firms may follow strategies of responding to the introduction of technology by others, rather than introducing technology themselves.[8] There may, of course, be other causes for that behavior; and it may even be that existing monopolization law would not proscribe market share so gained. Nonetheless, it is important to ask whether or not antitrust policies in fact operate to deprive consumers and the economy as a whole of the full innovative abilities of firms with leading market shares.[9] In this context, for example, the current Federal Trade Commission action against DuPont (titanium dioxide) is being interpreted by the business community as a warning that the acquisition of market share by passing through the cost advantages of improved process technology, and building capacity to support that share, is hazardous. To many executives the moral appears to be that the FTC would prefer a leading company to hold prices, restrict output and reap higher profits.[10] The FTC presumably intends no such thing, but it has not explained to the business community just what it does intend.

While the Department of Justice has stated its acceptance of the general proposition that "a firm which acquires a dominant position through the development or application of superior technology will not by virtue of this fact alone fall within the ambit of section 2," business executives may properly be concerned by the phrase "by virtue of this fact alone:" little in this world is accomplished by virtue of *any* single fact alone, and certainly market success is the resultant of many factors. There is some reason to believe that what the Justice Department and some of the cases envision as acceptable is no more than the passive, even reluctant, acceptance of market share "thrust upon" the successful firm. If that is in fact a correct interpretation of the Department's position, then the concern expressed earlier appears to be well grounded. The Department of Justice has also acknowledged that

> To the extent that the line between anticompetitive and desirable innovative behavior is in a small number of situations blurred, a firm may be hesitant to proceed on some projects. However, given the limited number of monopolies actually subject to Sherman Act, Section 2 attack and the paucity of cases involving structural relief measures upon a finding of section 2 violation . . . there is little basis for believing this type of behavior is widespread.

In substance, the Department is saying that a firm may proceed in close cases on the theory that the Government may not attack and the courts may not grant relief. But the fact that the Government *may* attack and a court *may* grant relief is itself a palpable and substantial consideration to firms which are already enjoying significant market place success: Such firms have a great deal to lose if those contingencies occur; and such considerations may well prove decisive at various stages in the innovation process.

Finally, it follows from the analysis that proposals for "no-fault" monopolization legislation, which would preclude consideration of the extent to which market success is attributable to technical achievement, are likely to further reduce the willingness of major firms to introduce innovations or pass on the cost savings which result from them.

2. While the conduct of research projects on an individual firm basis, or among firms which are not competitors, is ordinarily to be preferred, the Department of Justice should explicitly recognize that there are certain areas in which joint or cooperative research, even among large competitors, should be encouraged. This is particularly true in the case of high-cost, high-risk "breakthrough"-oriented projects. The generally procompetitive long-term effects of major innovation (as well as its benefits for the national economy as a whole) should ordinarily be given great weight. In such cases, the participants should be permitted wide latitude in allocating the intellectual property rights and other benefits which are the products of the research, where such allocations are in fact ancillary to, and supportive of, the legitimate purposes of the research.

Discussion.—The issue of joint research is clearly a difficult one. On the one hand, experience has amply demonstrated that in certain cases, where the nature, scale and difficulty of the task exceeds either the capacity or the willingness of individual participants, such projects can produce major and dramatic innovation.[11] On the other hand, such projects, and restrictive allocations of the property rights which result from them offer the potential of serious anticompetitive consequences. The Department of Justice and the courts have generally addressed the relevant factors: The likelihood that the research would occur in the absence of a joint arrangement; the distinction between basic research and advanced product development; the size of the firms; the limitation of future competitive restrictions (patent rights, territorial restrictions, know-how exchanges, etc.) to those which are essential.[12]

The question is the weighting of these factors; and the purpose of this recommendation is to encourage the Department to give greater recognition to the advantages of such projects in appropriate cases.[12A] The

[8] See, *e.g.*, J. S. Hilke and C. B. Goldfarb, *The Relationship Between FTC Activities and Private Sector Technological Growth*, memorandum to J. Baruch, October 16, 1968, at pp. 25–26.

[9] How, for example, should the chief executive officer of a firm with leading market share respond when informed of the development of a major technical innovation which, if immediately implemented, would gain substantial additional market share? The alternatives are: (a) to introduce the innovation, notwithstanding the advice of antitrust counsel that such a course will probably invite governmental or private litigation whose outcome is uncertain; (b) to offer technology licenses to competitors, thus reducing or eliminating the potential competitive advantage; (c) to introduce the innovation at a premium price, holding market share but increasing profits; or (d) to wait for the competition to discover and introduce the technology on its own.

[10] *See, e.g.*, "How Antitrust Charges Can Limit R. & D. Payoffs," *Business Week*, July 3, 1978, p. 48; Y. Brozen, "Antitrust Witch Hunt," *National Review*, November 24, 1978, p. 1470.

[11] Many important examples are found in wartime experience, when exigent defense needs temporarily supersede other considerations.

[12] See, *e.g.*, *Antitrust Guide for International Operations*, U.S. Department of Justice (1977) and cases cited.

[12A] It is noteworthy that the Business Review Program of the Antitrust Division has generally provided favorable responses in the great majority of the cases submitted. That being so, it is important to ask why so few proposals have been submitted for review. Several possibilities may be suggested. First, there may be problems of communication and perception—that is, the business and legal communities may be unaware either of the program or of its record in responding

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power to shelter domestic markets, etc.); and (b) the extent to which such practices in fact afford such firms competitive advantages over their American competitors. If the findings of this study indicate that such practices are widespread and competitively significant, the Administration should recommend appropriate remedial legislation to the Congress. Such legislation might provide for (i) protection of the American market from incursions of the products of such firms; or (ii) amendments to the antitrust laws to place American firms on a more nearly equal footing; or (iii) an explicit policy determination to take no action.

2. The extent to which foreign competitors engage in joint research activities among themselves should be both (a) a factor in Department of Justice consideration of proposed joint research activities by American firms and (b) a defense in antitrust proceedings arising out of such activities.

3. In acquisition cases under section 7 of the Clayton Act, the generally procompetitive short-range domestic effects of permitting large foreign firms with minor American market share to acquire American firms in preference to horizontal acquisitions by American firms, should be weighed against two additional factors: (a) the long-range competitiveness of the surviving American firms in both American and international markets; and (b) the international market position of the foreign acquiror. These factors are particularly critical where the acquired firm has a strong position in new or advanced technology. In such cases short-range domestic market benefits should not be permitted uncritically to override the potential long-range consequences of such acquisitions for the American economy as a whole.

4. Antitrust enforcement, while indisputably a cornerstone of American economic policy, must be considered as one aspect of federal economic policy as a whole, and not as an end in itself. While most antitrust violations present no genuine policy tradeoffs, many important enforcement policies and activities do, as exemplified by several of the recommendations concerning the impacts of enforcement activities upon innovation. Such tradeoffs should be fully considered within the enforcement agencies themselves, in regular consultation with other Federal Departments and agencies. If the enforcement agencies regard considerations of general economic policy as beyond their mission, then an interagency committee should be established to assure a sensible consistency between antitrust enforcement policies and overall national economic goals.

Note: Illustration of issues 6 & 7 may be found in a paper, pp. 30–44, prepared by one of the Subcommittee members. It is printed in its entirety because of its scope and excellence.

APPENDIX

ILLUSTRATION (FOR ISSUES 6 & 7) ANTITRUST AND INNOVATION

Introduction

The antitrust laws do not directly address innovation. Rather innovation is generally stimulated by competition; and the promotion of competition is the clearest objective of antitrust policy. While antitrust policies thus affect innovation only indirectly, the Subcommittee believes that such effects are nonetheless significant:

- Policies which stimulate competition unquestionably stimulate innovation as well: competition for technical superiority and for cost-reduction through innovative technology is a pervasive characteristic of the American economy.
- Policies which proscribe or limit conduct (such as certain types of collaborative activities) affect the use of such conduct as a means of innovation.
- Policies which affect business strategies (growth, acquisition, cost, and price reduction, etc.) affect the extent to which innovation will be employed in aid of those strategies.

The impact of antitrust policies upon innovation is often subtle, complex and unquantifiable. By stimulating competition, those policies may force innovation as a matter of competitive survivial. At the same time, other antitrust policies may so impact the risk/reward equation as to deter pre-innovative risk taking. The first phenomenon is so well-known as to require little discussion; the second deserves greater attention than it has generally received.

One of the principal effects of antitrust policies, as perceived by business decisionmakers, is to add a further category of risk to be considered in business decisions: The risk of attracting hostile antitrust scrutiny. In many cases, of course, this is a desired and valuable effect of antitrust policy, insofar as it deters conduct of questionable legality. But in the case of innovation decisions, this additional risk factor may produce unintended and undesirable results.

Innovation itself is inherently a high-risk proposition: The costs are substantial, the prospects uncertain; by definition, it involves the unknown. When other risks (such as the risk of provoking antitrust actions) are superadded to the equation, or when the prospect of reward is unduly circumscribed, the scales may tip toward the safer course of risk avoidance. Moreover, because the antitrust rules are necessarily imprecise, the business decisionmaker has difficulty in assessing the likelihood of adverse action or the magnitude of exposure. This compounding of legal, technical and economic uncertainty may in some cases prove fatal.

The following statements of Issues and Recommended Actions are intended both to recommend government policies which will reduce the deterrent effect of antitrust upon innovation-related decisions where no genuine anticompetitive threat exists, and also to provide a basis for analyzing the tradeoffs between antitrust considerations and other economic objectives. The Subcommittee believes that the dramatically changed position of the United States in the world economy requires that these tradeoffs be con-

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as a result, larger firms once dependent upon them as suppliers have been forced to either enlarge their existing operations, or integrate vertically.

- The unintended effects of regulations such as ERISA, together with overly restrictive SEC regulations have contributed to the exclusion of the intermediate size businesses from access to capital from public markets. The only alternative in most cases, is for the small business to seek a compatible larger company interested in acquisition.

- The natural growth objective of larger businesses, compounded by the effects of inflation and the double tax on dividends, creates a demand for performance which, in many cases, can only be met by supplementing their core business growth with acquisitions.

* * * * *

RECOMMENDED ACTION

1. New economic incentives are needed to offset the cost of capital investments required for regulatory compliance. Such incentives are needed not only to inhibit the unintended destruction of small innovative firms, but also to allow all manufacturers a greater percentage of their R. & D. budgets to be directed to technological development rather than compliance. One major pharmaceutical manufacturer reports that one-half of its budget allocated to pharmaceutical R. & D. is consumed in complying with requirements of various regulatory agencies.

Economic incentives to stimulate R. & D. efforts may be tax oriented such as accelerated depreciation, or debt oriented incentives such as low-interest government loans which are particularly important to the small firms.

Social incentives may also be effective such as awards for innovative methods of compliance, outstanding safety records, or for contributions to the environment through products and programs. Such social incentives will tend to ameliorate the present adversary relationship between business and the regulatory agencies.

2. To correct the present inequities of cost of compliance with regulations imposed on smaller businesses, it is recommended that all rulemaking bodies review present regulations, as well as to incorporate in all new regulations, a consideration of at least three levels of business size. The criteria for size could be based on gross revenues, for example, 0 to $2 million, $2 to $50 million, and those over $50 million. While substantive requirements should ordinarily be uniform for all size levels, procedures and paperwork required for compliance should take into account these variations in business size.

3. Information from various existing agencies should be integrated to form a data base to support an annual report providing a statistical analysis of all U.S. business in terms of several variables, including capital investment, gross revenues, and types of businesses to better identify those engaged in technological development. Such annual report to Congress and the Administration should highlight shifts in the statistical size structure of businesses, provide an index on technological growth, and, in particular, contain a report on the state of small business.

Illustration of "Costs of Regulation Lead to Increase Market Concentration"

Example: A Case History.—One of the more classic examples of the negative impact of regulations as they affect industry structure and competition is the experience of Excel Mineral Company, an innovative small mining and mineral development company, headquartered in Santa Barbara, Calif.

1. Uncertain regulatory costs precipitate sellout and increase market concentration:

Excel Mineral Company, in a joint R. & D. effort with another small company, found and successfully demonstrated an in-situ solution method of mining uranium by a pilot operation with both the Nuclear Regulatory Commission and Wyoming approvals. Due to economic uncertainty of future water quality standards, demands for further costly testing and agency procrastination, Excel was forced to sell a large interest to a major company.

2. FDA test standards prohibit market entry:

Excel participated in developing a special contact lens promising several months' use without removal. After 2 years, and $250,000 spent for FDA certification, a change in FDA rules suggested another 2 years of testing might be necessary. Because of the high risks and regulatory uncertainties, the product was sold to a major company. Regulations again lead to market concentration.

3. Agency delay shifts technology to Japan:

Excel Mineral developed a new process for producing strontia chemicals from a celestite ore deposit in the U.S. Plans for the processing plant to be located adjacent to their Taft, Calif. Plant have been delayed 3 years in a Bureau of Land Management attempt to verify that location as the habitat for the endangered, snub-nose, ring-tailed lizard. Economics dictate they will ship celestite ore to Japan instead of having the opportunity of being the only producer using domestic celestite ore.

4. Compliance costs make their products noncompetitive:

The Mine Safety Health Act of 1977 negatively impacts all U.S. mining operations. Mandatory training standards extended to nonmining operations will add $150,000 per year to Excel Mineral's product cost. Competition limits the product's price. Net results will be cuts in R. & D. budget in order to afford compliance costs from lowered profit margins.

5. The threat of Federal land withdrawal removes critical minerals from U.S. Reserves and destroys Company's future R. & D. plans:

Excel Mineral acquired and is currently developing rare-earth mineral deposits in Idaho for euxenite which is not found elsewhere in the United States. Euxenite

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"The higher prices set to obtain monopoly rewards not only create the classic deadweight loss of monopoly but also they limit the extent to which scale economies may be realized." [16] Given the high fixed capital costs and low marginal costs of the cable industry, there are indeed economies of scale.

Comanor and Mitchell estimate the loss from the higher prices which are protected by regulation. Using a price of $5 per month for the cable service, they estimate the loss at between $1 billion and $2 billion per year depending on the magnitude of demand elasticity.[17]

Issue No. 4.—Unconsidered Economic Impacts of Regulation Impair Industry Viability and Weaken World Market Positions

U.S. regulatory agencies are not presently required to account for the effect of their regulations on the competitive position worldwide of the industry being regulated. In addition, U.S. Government agencies more often than not adopt an adversary role vis-a-vis industry in contrast to the obvious cooperation between Government and industry evidenced in Europe and Japan, further altering the competitive balance.

When regulatory policies and actions fail to take into account the impact on innovation, productivity, overhead costs, and worldwide competition, domestic economic strength and U.S. leadership worldwide is substantially eroded. Loss of world market position results in loss of employment, severely impacts the balance of payments, and weakens a firm's financial position, reducing overall the financial capability of a company to carry out aggressive innovative programs. Reduction in innovation has a negative impact on the growth of national output per capita and progress in the standard of living, leading to today's highly visible productivity growth lag, sluggish economy, inflation, and trade inbalance.

* * * * *

RECOMMENDED ACTION

In considering and establishing regulations, policies, and even legislation, U.S. Government agencies should be required to study the impact of their actions upon the worldwide competitive posture of U.S. industry.

Specifically, all regulatory agencies should be required by appropriate authority:

1. To review existing regulations in light of the impact of industrial productivity, overhead costs, innovation, and worldwide competitive positions.
2. To propose appropriate legislative or regulatory amendments and/or changes in agency discretionary policies and procedures in accordance with the above criteria.
3. Prior to future rulemaking or standard setting, to determine the impact of their proposal on industrial productivity, overhead costs, innovation, and the worldwide competitive position of the industry being regulated and to make this determination available for public scrutiny.

[16] *Ibid.*, p. 198.
[17] *Ibid.*, p. 205.

Illustrations of "Unconsidered Economic Impacts of Regulation Impair Industry Viability and Weaken World Market Positions"

Example No. 1.—In Japan and Western Europe, incentives exist which are a combination of financial, economic, and promotional measures in which Government and industries cooperate closely and coordinate their activities to achieve commonly agreed-upon objectives. Government subsidies provide for importing raw materials and capital goods necessary for industry, currency control and quotas to restrain import of competitive products, point Government/industry programs to penetrate foreign markets through selective credit controls, and dual pricing.

The U.S. aviation industry has been commercially disadvantaged due to foreign subsidies, thus eroding U.S. ability to undertake research and development by reducing operating profits. This is a direct result of the fact that most major foreign countries subsidize their aircraft industries. In Europe, currently the only direct competitors for commercial jet liners, such subsidy takes several forms:

A. Capital expenditures which do not have to be amortized by product sales.
B. Direct funding of program development and production, in the form of outright grants, low interest loans, or loans that do not have to be repaid until the program is profitable.
C. Currency subsidy, providing a differential between the current dollar exchange rate and a more favorable exchange rate so that sales may be made at a more favorable dollar cost.
D. Special funds for marketing.
E. Special financing arrangements.

It is estimated that during the last 10 years, about $6 billion worth of European government subsidies have been provided for development and production of commercial aircraft and engines. The effect of such subsidies is currently felt most strongly in the A-300 and A-310 programs. The A-300 and A-310 have thus far achieved only a small percentage of the total market, but their market penetration is increasing rapidly. In the process, they are eroding profits in many of the sales which U.S. manufacturers win due to the need for the U.S. manufacturer to reduce prices to meet the non-U.S. competition.

In addition, foreign governments have frequently subsidized, in one form or another, their industries pricing of production of components for U.S. programs. Examples are identifiable in Canada, Italy, Japan, Australia, and Belgium. These manufacturers have penetrated the U.S. market and in the process acquired U.S. technology which is then available to create competitive products.

Example No. 2.—The basic objective of regulations aimed at pollution control should be to strive for the most effective; but establish standards that are attainable in keeping with the pace of the developing state

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ing performance standards for all materials. The latter course would leave industry innovative flexibility to develop alternate *safe* ways of accomplishing standards with the best and lowest cost materials that can be developed.

With the growth rate in the use of electric current, copper may not be available at a reasonable price to meet future needs. Alternate materials such as aluminum, aluminum alloys, sodium, and glass filaments need to be further developed.

CPSC has steadfastly refused to give credence to the wire industry and has ignored new technology developed several years ago that would expand the use of competitive alternate materials.

Issues No. 3.—Regulation of Price and Entry Impedes Innovation

Private corporations whose prices and entry are regulated by Government are discouraged from departing from the status quo, thus retarding innovation. Governmental price and entry controls in competitive markets are unwarranted unless there is a national emergency. Their imposition distorts market forces and hence influences both industry structure and competition. Private corporations which operate in competitive or potentially competitive markets where prices are controlled by Government are insulated from the innovation-encouraging pressures of marketplace price competition. The Nation and the consumer would be better served if price and entry regulation of competitive industries was removed so that market oriented innovations, which are the natural result of competitively determined market prices, could flourish.

RECOMMENDED ACTION

1. During periods when no national emergency exists, governmental price and entry controls of products or services sold in competitive markets should be rapidly eliminated. Where such controls are required by legislation, initiatives to modify the legislation to eliminate governmental control should be introduced and actively pursued. Prior to such legislative modification, regulatory agencies should ensure that their regulations cause minimal market distortions. Entry to potentially competitive markets should likewise be deregulated.

The recent innovations in these respects at the Civil Aeronautics Board are examples of action in support of the above recommendation. Moreover these recent innovations provide excellent examples of the benefits to be derived from implementation of the above recommendation. Prompt consideration should be given to extending the CAB innovations to other Federal agencies having the power to regulate industry prices or control entry of new competitors.

Illustrations of "Regulation of Price and Entry Impedes Innovation"

Reference No. 1.—(Excerpted from Robert DeFina, *Public and Private Expenditures for Federal Regulation of Business,* Center for Study of American Business, 1977.)

With regard to innovation, there is evidence in the literature that regulation imposes large costs on railroads. Ann Friedlander estimated this "secondary loss" due to retarded innovation at between $12 million and $41 million.[1] In the same study, she estimated that, in 1964, inefficient pricing caused a "deadweight" loss in the railroad industry of between 2 percent and 1.79 percent of rail revenue. She notes that accounting for distortions to complementary goods would add another .0022 to .0044 percent of gross national product. The total figure for 1964, then, was between $220 million and $270 million.

With respect to excess capacity costs, she estimates that costs are between $2.4 billion and $3.8 billion. These figures are rather high and so her "low"' figure is placed in the "high" column in table 1.

The following table, table 1, is taken from Thomas Moore's testimony before the Senate Subcommittee on Transportation and Aeronautics. The table combines estimates of Merton J. Peck,[2] Robert W. Harbeson,[3] and Ann Friedlander.[4] The estimates cover the period from 1964 to 1969. The figures are updated here in a relatively crude manner by assuming that the portion of industry revenue which the costs represent has remained constant from 1969 to 1975.

Harbeson's estimates of the cost of traffic misallocation have been questioned. Moore himself has stated that, ". . . this author (Moore) remains unconvinced that the amount of traffic that would shift from motor carriers to rails is substantial. . . ."[5]

Kenneth Boyer, in a recent article,[6] disagreed with the comparative-cost methodology employed by Harbeson. Boyer argued that the loss of rail traffic, to highway transportation in the 1950's and 1960's was due, to a large extent, to superior service quality, with minimum rate regulation playing a minor role. In his study of the subject, Harbeson found this service differential to be rather small, implying a great sensitivity to rate changes. Boyer, on the other hand, presented evidence which, ". . . casts doubt on the standard method for calculating the service differential . . ."[7] Boyer states that reducing rail rates by even as much as 50 percent will have only a small effect on traffic allocation since, as he argues, ". . . the choice is dominated by a large service differential."[8] Deregulation then, will have only minimal effects.

The main result of Boyer's study is that the size of the service differential has been underestimated in previous studies by at least an order of magnitude causing an overstatement of economic loss due to traffic mis-

[1] Friedlander, Ann, "The Social Costs of Regulating the Railroads," *American Economic Review,* May 1971.

[2] Peck, M. J., "Competitive Policy for Transportation?" in Almarin Phillips (ed.) *Perspectives on Anti-Trust Policy* (Princeton University Press, 1965), pp. 261–5.

[3] Harbeson, R. W., "Toward a Better Resource Allocation in Transport," *Journal of Law and Economics,* October 1969, pp. 322–34.

[4] Friedlander, op. cit., p. 226.

[5] Moore, T. G., *Freight Transportation Regulation: Surface Freight and the Interstate Commerce Commission,* Washington, D. C., American Enterprise Institute, 1972.

[6] Boyer, K. D., "Minimum Rate Regulation, Model Split Sensitivities, and the Railroad Problem, "Journal of Political Economy, June 1977, p. 493.

[7] *Ibid,* p. 501.

[8] *Ibid,* p. 496.

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[8] *Ibid,* p. 496.

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task force of the President's Energy Resources Council, in evaluating the requirement for environmental impact statements, claims that the major uncertainty was not whether a project would be allowed to proceed, but rather the length of time that it would be delayed pending the issuance of an environmental impact statement that would stand up in court. In assessing the overall impact of Government regulatory activity on the establishment of a new energy industry, the task force concluded ". . . some of these requirements could easily hold up or permanently postpone any attempt to build and operate a synthetic fuels plant."

Issue No. 2.—Innovation is Negatively Impacted by Regulating the Means Rather than the Ends

In the last 10 years, the United States has instituted a large number of social laws and regulations that have a major impact on the economy's rate of growth, the rate of inflation and the degree of competition within the industrial sector of the economy. If the laws and regulations had controlled only the output, innovation within firms and within industries to achieve the goals would have been stimulated and the type of competition and resulting industry structure would have been similar to that which would be expected to result from the competitive market system.

However, the regulations resulting from the adoption of new social regulations have not been goal oriented. Rather than requiring a specific output such as accidents per 1,000 hours worked or parts per million of a substance in a plant's effluents, the regulations control the industrial processes themselves. Such process regulations (sometimes referred to as input as opposed to output regulations) prohibit innovation as a means of achieving the required goals. Frequently, they have severe financial impacts on individual firms or plants; the nonproductive expense has a multiplier impact on innovation related to product or process improvements. Importantly, the input regulations inhibit competition and dictate, although not directly, industry structure. Thereby such regulation negatively impacts capital investment and aggravates the Nation's inflation problems.

The problems associated with such process regulation are increased by both the adversary atmosphere that exists between the regulatory agencies and industry and the lack of stability in the regulations or the reasonableness of the timing parameters required to achieve compliance.

* * * * *

RECOMMENDED ACTION

1. Regulations promulgated to achieve desired social goals should be limited to standards of performance. They should not dictate the processes used by industry to achieve the standards. Such a refocusing of regulations would foster innovation both in meeting the standards and, because such regulations would allow compliance at lower cost than the current process regulation, industry could devote more resources to product and process innovation.

The benefits to the Nation that could reasonably be expected from such a reorientation of the regulatory approach are clearly great although an exact quantification of the benefits is not possible. Example 1, which discusses the impact of mandating coal use in industrial boilers and requiring "best available control technology" (BACT) to meet environmental goals, results in about two-thirds of the 1977 to 1990 incremental coal consumption in industrial boilers becoming uneconomic at an estimated cost to the Nation of $1 to 2 billion/yr. If similar cost estimates were available for all of the process dictating regulations, the total cost to the Nation would be many times greater.

2. A nonadversary approach should be encouraged via directives to the regulatory agencies to increase industry participation in regulation development. The achievement of social goals can be most efficiently achieved if both business and Government work together. The adversary approach to regulating industry needlessly complicates the achievement of the standards, may increase the costs of both business and Government of regulation implementation and can inhibit competition and adversely impact industry structure. The second example relates a case involving the implementation of the Toxic Substances Control Act which is being done in a nonadversary manner that will save both industry and Government expense. Regrettably, this type of example is scarce. The various trade presses are replete with examples of adversary governmental regulators' relations with business.

3. Time schedules for regulatory compliance should take into account new technology required and current plant investment. Unrealistically short times and the requirements for utilization of the best available control technology often dictate utilization of a single technology and should be avoided. Technological innovation is frequently time consuming. Short compliance schedules can severely limit competition among firms in both meeting the regulatory standard and in the design of the process or product.

Illustration of "Innovation is Negatively Impacted by Regulating the Means Rather than the Ends"

Example No. 1.—The Mandatory Coal Conversion Act requires that, after 1985, coal be consumed in all new and replacement industrial boilers larger than 100 million BTU/hour. An examination of the economics of industrial energy consumption and pre-1977 environmental regulations indicated that low sulfur western coal would have been economic in much of the Midwest and Gulf Coast regions of the country. The Clean Air Act Amendments of 1977, however, require the adoption of the "best available control technology" (BACT) to both meet emission limitations and a percentage reduction in pollution from untreated fuel. With current technology, BACT will probably require the installation of flue gas scrubbers on all industrial coal burning boilers above 100 million BTU/hour and significantly limit the flexibility of companies to purchase lower sulfur coal to meet environmental standards.

The BACT requirement increases the costs of industrial process steam in the range of 10 to 12 percent for those plants that could have met environmental

RECOMMENDED ACTION

1. Regulations promulgated to achieve desired social goals should be limited to standards of performance. They should not dictate the processes used by industry to achieve the standards. Such a refocusing of regulations would foster innovation both in meeting the standards and, because such regulations would allow compliance at lower cost than the current process regulation, industry could devote more resources to product and process innovation.

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Report of the Industrial Subcommittee on Regulation of Industry Structure and Competition

BACKGROUND

The Domestic Policy Review of government impact upon innovation and its effect upon industry structure and competition comes at a critical stage in the evolution of America's worldwide economic role.

In the 200 years of this country's existence, the world has witnessed a small agrarian economy grow to become, in the post-World War II era, the dominant economic force in the world.

But America's role has changed, in many ways dramatically. Yet the laws and policies governing an economy of one era—that of U.S. dominance—have not adjusted to the reality that the United States is now but one of several major economic powers whose combined strength well exceeds our own.

It is the recognition of that new economic reality, that prompts a series of precise recommendations aimed at redressing the growing diminution of America's economic strength.

Importantly, the President, through his initiation of a serious policy review of innovation in America, implicitly recognizes innovation's key role in ensuring the long-term well-being of our nation's economy.

In so doing, he has helped lay the groundwork for an important bridge between industry and Government. Too often in the past, the interaction between business and Government could only be characterized as adversarial. By drawing representatives of business into the policy processes of the Administration, attitudinal barriers that have separated business and Government can be breached.

THE CRITICAL ISSUE

At the center of this Subcommittee's examinations was the certainty that economic growth and long-term economic health and stability is dependent upon innovation. It is the essential force that generates new products and processes, creates productivity advancement and stimulates constructive competitive activity.

In its study of the innovation climate in the United States and Government's effect upon industry structure and competition, the Subcommittee reached one overriding conclusion. That is that the policies as well as the philosophy that today guide antitrust and regulatory practice must be rethought in light of a variety of new worldwide economic forces that now prevail and the less dominant role this country occupies on the economic stage.

It is in these two important areas of government interaction with business—regulation and antitrust—where the most profound effects are present in the structural and competitive nature of American business and industry.

A REVISED CHARTER FOR REGULATION

The principle animating regulatory authority, as in the case of antitrust policy, has been accepted by society at large as a necessary and proper function of government. When regulatory practice is conducted with prudence and consistency, it can improve the climate for innovation.

In recent years, however, inconsistent and sometimes unreasonable regulatory actions have caused, in the Subcommittee's judgment, an unproductive diversion of resources.

In part, this diversion is from resources that would otherwise contribute to innovation: funds for R. & D. are diverted to testing programs for environmental and health effects, greater than prudence dictates, reducing the funds available for new product or process innovation.

Pollution control resources are diverted to mandated process changes rather than allowing industry to reach its own innovative solutions that achieve the desired, legal end result. This added expense reduces capital that would normally go to innovative productivity gains. The risks of innovative actions, too, have been inhibited by the uncertainty of regulatory policy and the frequent lack of consistency between and within regulatory bodies.

This uncertainty may be the greatest inhibitor to the innovation process and requires serious attention and response from the regulatory bodies and, in the Subcommittee's judgment, the Administration.

In all of these areas and more, the Subcommittee has focused on what it sees as the critical regulatory issues and proposes constructive solutions that can

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to give workers information relating to their potential exposure to hazardous substances, or perhaps it is reluctance to give consumers information which might expose them to liability actions. It does not appear to the Public Interest Subcommittee that it is innovation which is at issue here.

Do Reporting Requirements Impede Innovation?

The burden of excessive reporting requirements is another issue which has very little to do with innovation. Again, one would have to look at the totality of the way time and resources are allocated within a firm before accepting the proposition that reporting requirements "divert valuable facilities and manpower from other R. & D. activities." In fact, there is some evidence that corporations make the bare minimum of commitment of resources to monitoring and reporting —including commitment to monitoring and reporting on health and safety for their own management. For example, we understand that out of 1,200 manufacturing companies recently surveyed, only 300 had a product safety director working either full time or part time. That does not indicate much of a corporate commitment to product safety, nor does it indicate an undue drain on resources or manpower.

Does Liability for Product Failure Deter Innovation?

The report notes product liability cases and the uncertainty of recall as detering companies from innovating. The two examples used were poor ones. One was the Firestone tire recall, which really had nothing to do with innovation. It was a case of copying tires from abroad, with too little engineering development and testing. It certainly was an example of how resources can be diverted from innovative technical work due to corporate mismanagement, corporate error, and the unwillingness of Firestone company executives to listen to their own people who were cautioning on the tires' safety defects.

The leadership of the Firestone Tire and Rubber Company was aware of separation failures (wherein the steel belts did not adhere to the tire carcass) in 1972; persistently, however, they downgraded the failure rate, even before Representative John E. Moss' House Commerce Oversight Subcommittee. A January 1976 document showed the failure rate to be as high as 20 to 25 percent. Under the auto safety law of 1966, the Firestone Company officials should have reported that defect to the Government and to the public. Instead, they remained silent as people died and were injured.

The second example given concerned product liability and involved the Pinto fuel tank. The report complains about "unlimited severity of financial loss." In this connection, one needs to point out that the Ford Motor Company did not have to subject itself to a product liability suit.

Here again, the Ford Motor Company knew of the Pinto's fuel tank hazards as early as 1969, which also were not reported to the Government or the public. Nonetheless, Ford chose to ignore these in favor of saving $22 per Pinto and, knowingly, subjected the American people to an unnecessary risk. Accordingly, a California judgment of $128 million in the product liability suit concerning the Pinto included a jury-awarded punitive damage of over $100 million against the company for its handling of the case. Companies have only to behave fairly to avoid such damages.

In short, the two examples used to support the contention that product liability is excessive really have nothing to do with factors inhibiting innovation. In both cases, company officials could have managed their business more effectively and insisted upon adequate quality control procedures. There is no evidence to support the recommendation that measures to limit corporate product liability would enhance innovation. On the contrary, the examples chosen by industry suggest that measures to limit liability would encourage poor management rather than innovation.

Shaky Foundation

Having carefully considered the above eight points, the Public Interest Subcommittee cannot accept the Industry Subcommittee's contention that regulations are having a "severe negative impact on the industrial innovative process and its important result, increased industrial productivity." Rather than belabor the details of the industry recommendations, which rest on these faulty assumptions and perceptions, we would turn our attention to the benefits of regulation for innovation, particularly those benefits which could be reaped in an atmosphere of corporate responsibility and cooperation.

Regulation as a Spur to Innovation

It is important for us to recall that because of laws, cars are cleaner, more fuel efficient, and safer. Not as good as they could be, but better than they would have been. Alvin Weinberg, former director of Oak Ridge National Laboratory and a strong advocate of nuclear power, has said that nuclear reactors are safer because the public interest community criticized the nuclear industry and asked American industry to perform at the level it is capable of performing. In a number of cases—including modest technologies such as a clutch/brake safety mechanism on power mowers—the very existence of innovation seems to correlate with what the industry report labels as "escalating regulatory controls."

In this connection, it is also important to recognize the benefits of government regulations to corporations. Some companies which have been most resistant and recalcitrant about regulations are turning their attention to profitmaking activities in recycling. For example, the head of Dow Chemical told *Business Week* recently that his company was making a profit already by recovering pollutants for industrial use. Experience tells us that if the cost of this recycling is so much in the first year or two, it will go down 10 years after the recycling effort began. It is a pity that industry officials

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It is not surprising that the industry is in that situation. It is a matter of priorities. The research behind the auto industry's search for a sexy or feline image for its cars has never improved productivity. Nor has the investment they have made yearly in retooling for new body styles. If priorities and resource allocations were changed, we might yet get some innovations which truly enhance productivity through auto safety and fuel efficiency.

In considering the totality of the allocation of corporate funds, it is also appropriate to look at expenditures for advertising. Advertising is particularly heavy in the drug industry. As listed by *Advertising Age,* 13 of the 100 companies spending most on national advertising in 1977 were drug companies. One study puts research costs at 9 cents out of every pharmaceutical sales dollar, while promotion took up 20 cents out of every dollar.

Nor is the drug industry alone. In the 4 years from 1971 to 1975, expenditures on national advertising rose by an average of 6.9 percent per year. But more recently, from 1975 to 1977, expenditures have been rising at an amazing 19.1 percent per year.

In 1976, total expenditures on all types of advertising came to $33.5 billion. In that same year, research and development expenditures by industry totaled $16.5 billion. We cannot help but conclude that industry is willing to spend twice as much to switch consumers from one brand of soap to another, or to convince our children to eat sugared breakfast cereal, or to induce us to risk cancer by smoking than it is willing to spend to develop innovative products. If innovative products were forthcoming, products which fulfill the needs of consumers, surely all of that extravagant hype would not be necessary. Such products would sell themselves on their own merits.

In short, industry has spent large sums of money for too many truly nonproductive purposes for us to accept the proposition that regulation has diverted capital expenditures from productive to nonproductive assets. Substantial proof, which considers the total allocation of resources within a company, should be required before any such proposition is accepted as a basis for public policy.

Do Regulations Increase Costs Without Benefit?

The report of the Industrial Subcommittee says that ". . . the cost of developing regulated new processes and products has increased alarmingly without commensurate benefit to society." Some costs have indeed increased, but to say "without commensurate benefit to society" is to prejudge the case. We see no evidence offered in support of such a statement.

The entire subject of costs, both of new process and products and of retrofitting, is again a matter of selective perception and definition. Consider for example, industry's complaint that some new projects do not get funded because of increased costs.

The industry points out that "Many projects, if they could exist without regulatory impact, would provide rates of return at the high end, but are not funded because of the depressing effects of regulatory costs in the rate of return calculations." The very fact that such projects are not funded, that such projects do not come to fruition, should not be viewed as a "cost" to society, but as an intended benefit of regulation.

What does it mean to say that a project would be profitable without regulation but is not profitable if the cost of regulation is included? Such a statement only reflects the fact that business, in its rate of return calculations, has not and does not take into consideration the costs which it foists on its workers, the community and society at large. When regulatory costs must be added into the equation, they force at least a partial accounting for these "externalities." One goal of regulation is to encourage a gradual shift in the Nation's economic activity in safer, cleaner directions. This is accomplished through forcing such an accounting. When some projects which would only be profitable without environmental, health, or safety regulation are stopped, then, it must be counted as a clear benefit to society.

Even if one takes a more conventional view of cost/benefit relationships, the case for regulation increasing costs ". . . without commensurate benefit to society" is far from proven. Consider the vinyl chloride case where initial cost-of-compliance estimates of $65 to $90 billion were widely publicized. So far, the cost of compliance has turned out to be a shadow of that amount —less than $350 million. New technology developed for compliance not only reduced worker exposure, but also increased efficiency, so that the expectation is for a savings rather than increase in production costs. Such cost-of-production savings will come in addition to savings in health costs, lower compensation costs, increased worker productivity and similar benefits which will flow from reduced worker exposure.

A study by Lester Lave and Eugene Seskin for Resources for the Future, which spans 10 years of experience with standards for emission from stationary sources, gives another example of net savings as a result of environmental, health, and safety regulations. While EPA estimates that meeting State and national standards for stationary sources will cost $9.5 billion (in 1973 dollars) in 1979, Lave and Seskin estimate that the potential benefits from an 88-percent reduction in sulfur oxides and 58-percent reduction in particulates (corresponding to EPA's projections), in terms of improved human health alone, will be approximately $16.1 billion for 1979 (in 1973 dollars). The estimated benefits do not even include gains in property values or gains from the improved health of plants and animals.

These are just two examples—although significant ones—of instances where the benefits of regulation far outweigh the costs. As the country gains more experience with regulations, we would hope that phrases such as ". . . without commensurate benefit to society" can be dropped from the reflexive response of industrialists to regulation.

Do Regulations Cause Delays?

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together in a single sector (i.e., the public sector), a more rational tradeoff can be made. A similar policy is already being utilized in the funding of municipal waste water treatment facilities by federal grants.

4. Improve the risk/reward ratio for innovators-sponsors by:

- Reducing the uncertainty in content and timing of regulations
- increasing the timetable allowed for compliance.

As pointed out in the section entitled Business Decisionmaking Criteria, the concept of time value of money is central to private sector decisionmaking, yet it is largely ignored in environmental laws and regulations. The effect of delay and uncertainty is overwhelming when viewed by the decisionmaking criteria in common use in the business sector.

The effect of increasing the timetable for compliance would be to spread the capital cost requirements further into the future, thus releasing funds for investment in innovation.

5. Decrease the regulatory inhibition to the innovative process by:

- Providing protection of proprietary information,
- establishing priorities for enforcement action.

The first recommendation is based on the competitive value of proprietary information in providing a time advantage to the firm possessing valuable trade secrets. This problem has been recognized already and a solution to the problem is urgently needed.

Establishing priorities for enforcement action would concentrate efforts on the most needed areas and give more time to the lower priority areas, permitting search for more innovative solutions and freeing up time-dependent resources for deployment in general innovative developments.

6. Separate the functions and powers in the regulatory system by:

- Separating standard-setting from enforcement
- providing appeal mechanisms outside the agency,
- setting up special courts with expertise to understand the issues involved.

Public policy should have as its primary concern the establishment of goals and sanctions for violations. Present regulatory policy is falling into the classic pattern of concentrating on ever finer details. Detailed regulations inhibit the innovative process by constraining the number of solutions to problems that can be considered or tried without violating the detailed regulations. In general, society has found that separating the police power from the definition of infractions is the most effective way of securing the social benefits of individual freedom while protecting society as a whole.

The point to be made regarding appeal mechanisms is much the same: Internal appeals within an agency may not be effective in correcting injustices and may provide little satisfaction to the petitioner that his appeal has been impartially heard.

Because the issues typically involved in regulatory matters usually require specialized expertise in science, technology, and other disciplines, it may be necessary to have special courts for appeals that could, by devoting their efforts to such cases, become knowledgeable in the areas involved.

7. Improve the process of regulation by:

- Developing standards based on consensus among knowledgeable and interested parties,
- increasing public participation early in the process to reduce the need for later (and disruptive) intervention and litigation,
- allowing arbitration in enforcement actions
- emphasizing results rather than methods of compliance.

These represent alternatives to the direct and detailed regulatory policy now being followed. The principal benefits to the innovative process would be to increase the degree of flexibility permissible in providing innovative solutions to achieving environmental goals.

Each of the above recommendations has an independent value and warrants consideration on its own merits. Obviously, some of the recommendations would immediately improve the climate for innovation, while others are indirect and long range. Nonetheless, the environmental panel believes all are worthy of serious consideration.

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In general, it can be stated that present EPA regulatory policy tends to follow a "worst case" approach (i.e., emission standards are based on the assumption that a large number of sources will impact a large and susceptible population). While such a policy will minimize risks, it is extremely expensive and, almost by definition, is not cost effective.

Effects of Time Constraints

Time constraints imposed by law have had the effect of forcing a high rate of capital expenditure to achieve compliance in a relatively short time span. Some specific industries have been affected to the point where their continuance is jeopardized, particularly where other economic factors such as low price levels limit the industry's ability to raise or generate capital. This is true of the steel industry and the copper/lead/zinc industry.

Large mandated capital outlays force an industry to delay or forego productivity improvements and preclude the application of innovation. For example, the proposed definition of "hazardous waste" under RCRA is based on a "worst case scenario."

The Impact of Regulatory Delay by Business Decision Criteria

A common analytical technique used by business is discounted cash flow. To use this methodology, the analyst estimates the cash inflows and outflows that the project entails or the decision creates. Future payments or receipts are "discounted" by the interest rate or rate of return required. For example, at 12 percent interest, a dollar today is worth $1.12 next year. A dollar next year is worth $0.89 (=1÷1.12) today. For multiyear or fractional year periods, compounding is used in an appropriate form.

However expressed or formulated, the notion described above is central to the businessman's approach to decisionmaking as it is the principal means by which actions are evaluated and alternatives compared. This is not to say that other considerations are lacking or ignored, just that profit and its timing are central to motivation in the private sector.

If a new product will have sales of $10 million a year for 10 years before it is displaced by other products, the "present value" of those sales is $35.7 million at a 20 percent discount rate (typical of what a businessman might use, allowing for the cost of capital and some risk or uncertainty in the realization of the anticipated $10 million). If the cost of producing the product is 85 percent of the selling price (a 15 percent margin) and taxes are 50 percent of net income, the present value of the profits is $2.4 million.

Now, if there is a delay in introduction of the product due to regulation or other causes, the present worth of the product to the company declines as shown:

Delay (years)	Present worth
0	$2.4 million
1	1.9
2	1.5
3	1.2
4	1.0
5	0.8
6	0.6
7	0.5
8	0.4
9	0.3
10	0.25

If there is a 7-year regulatory lag, the product line is worth only about 20 percent (0.5/2.4) of what it would be otherwise. With the regulatory lag, far fewer products will be attractive when analyzed by the businessman.

Another way of illustrating the point is to determine how large the profit margins on the product would have to be in order to obtain the same profits as those obtained without regulatory delay.

Delay (years)	Profit margin required for equivalent results
	(Percentage)
0	15
1	18
2	22
3	26
4	31
5	37
6	45
7	54
8	65
9	77
10	93

At longer delay times, even if the product cost nothing to produce and its selling price were clear profit, there would be no way of getting the desired results. Needless to say, there are few products where profit margins of 50 percent or more can be realistic prospects, so regulatory delay inhibits even the initiation of the innovative process.

Public Participation in the Regulatory Process

The most useful time for public participation in the regulatory process is near the beginning when principles and policies are being established, rather than in the implementation details. Perhaps because of unrealistic timetables mandated by the underlying legislation, hearings may be hastily organized and held only in Washington. When policy is developed and promulgated without much effective public participation, it is not surprising when there is a later reaction in the form of lawsuits and intervention in the permitting process. Taking more time at the outset and holding regional hearings at convenient locations could max-

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quickly or slowly they become wholly uncompetitive internationally and either disappear or require massive public subsidies.

Perhaps the most significant problem in environmental regulatory policy lies in the methodology used to establish standards. This is particularly true in examining the process whereby national ambient air quality standards are set and translated into regulations. This situation comes about because of increasing reliance on epidemiological data to set national standards. The epidemiological technique involves the statistical study of populations exposed to pollutants. In the past, the technique was widely used by public health specialists to determine promising avenues for research designed to clinically evaluate effects of exposure to specific pollutants. By statistically manipulating data, it is possible to get indication of potential effects which can then be followed up by clinical tests under controlled laboratory conditions to determine specific toxicological impacts on exposed populations. The use of the technique for standard setting involves accepting a number of assumptions:

(1) That variables measured in the experiments are indeed relevant,
(2) that specific dose-response characteristics exist,
(3) that the dose-response measured in one physical environment applies equally well to other population sites,
(4) that in the case of delayed effects, a relationship between the prior damage and subsequent physiological damage at a later time can be assumed.

In general, the standards established tend to define a "worst case." That is, they are based on responses in in the most susceptible fraction of the population under study to an exposure. In effect, for the standard so derived to be valid one must assume that susceptible elements of the population are exposed to an infinite number of sources at all times. If such conditions exist at all, they are more pronounced in an urban environment where the pollutant may be ubiquitous.

Clearly, a great deal of additional work must be done if the more subtle effects of specific pollutants are to be properly characterized. The scientific bases for many of the pollutants now being regulated simply are insufficient to justify setting specific numerical standards —nor will they be until adequate and carefully controlled experiments are undertaken.

The United States has not embraced a policy of demanding a completely risk-free society. Congress demonstrated this clearly by exempting from TSCA a consumer product which is one of the most widely suspected cancer-causing substances: tobacco and tobacco products. We can never create a zero-risk environment and both laws and regulations must reflect this fact of life. In a free enterprise society the marketplace itself is a valuable, democratic, selective device for acceptance or rejection of various alternatives for a given issue. The marketplace establishes the risk society finds acceptable.

The overall result of the application of the principles outlined above is a relatively inflexible set of constraints that differentially affects different segments of industry. The following sections of this report explain these as they influence the innovative process.

The economic consequences of these policy decisions are becoming increasingly apparent:

1. They result in unequal distribution of costs by industry and by geographic location which, in turn, alters traditional competition for domestic markets;
2. They result in reduced price/cost margins which lead to lessened ability to compete in world markets, particularly commodity markets;
3. The limited supply of capital available to any company is preempted for environmental expenditures;
4. The timetable for compliance is so short that only presently available technology can be seriously considered.

On the positive side, new industrial opportunities have been created for goods and services needed to meet environmental requirements.

Impact of Environmental Regulation on the U.S. Economy

Surprisingly, comparatively few studies have been carried out to evaluate the costs and benefits of U.S. environmental policy on the total economy. EPA and the Council on Environmental Quality have had annual econometric studies made by consultants which indicate the effects on the gross national product and on inflation. E. F. Denison of the Brookings Institution has published a more narrow study concentrating on the impact of environmental regulation on American industry. (Edward F. Denison, *Survey of Current Business,* January, 1978.) While these studies show net adverse economic impact, they do not attempt to quantify the overall benefits from improved health and welfare. In fact, in the 8th Annual Report of the Council on Environmental Quality, December, 1977, the following appears.

> The result of our environmental programs is expected to be a substantially improved quality of life for all citizens, both today and in the future. Some improvements can be roughly estimated in monetary terms. Others cannot. The 1975 Annual Report summarized estimated benefits at that time.
>
> Since then little has been done to provide better economic measures of the benefits attributable to environmental control programs. Nevertheless, the benefits are expected to exceed the cost substantially. Unfortunately, it is not possible to quantify the benefits along with the costs.

Obviously, a great deal remains to be done in this field.

Economic Impact of Environmental Regulation on the U.S. Industrial Sector

A number of studies have been carried out to identify both adverse and positive impacts on specific segments of the U.S. industrial sector. Adverse capital costs and continuing operating costs vary widely over a substantial range, depending on the industry. Service industries tend to be low, fabricating industries require

suspected cancer-causing substances: tobacco and tobacco products. We can never create a zero-risk environment and both laws and regulations must reflect this fact of life. In a free enterprise society the marketplace itself is a valuable, democratic, selective device for acceptance or rejection of various alternatives for a given issue. The marketplace establishes the risk society finds acceptable.

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diversion of some 7 percent of capital to environmental control, and the basic industries have capital preemption ranging from 30 to 50 percent. The six most heavily affected industries are electric utilities, the copper/lead/zinc industry, and steel, chemical products, pulp and paper, and petroleum refining.

The industries that are most severely affected share a series of common characteristics:

1. They are basic in that they deal with conversion of basic raw materials to intermediate products which are in turn used in manufacturing products;
2. The industries are all capital intensive (that is, the investment required per dollar of sales is considerably greater than the U.S. average); and
3. They are capital extensive (that is, in order to secure economies of scale, individual facilities tend to be very large).

The ability of these industries to expand and modernize their productive systems is called into question since reduced profit margins, coupled with greatly increased capital cost per unit of output, have reduced anticipated return on investment to levels that are unattractive to investors.

Operating cost impacts are caused primarily by the increased costs associated with day-to-day use of specialized emission reduction equipment, and these costs usually are not offset by revenue from recovery and sale of byproducts.

The international competitive effects of environmental standards arise because standards are national requirements whose costs are included in exports, but not in imports. Either a "pollution equalization tariff" or certification of manufacturing compliance might be a way for including environmental costs in imported products.

While capital and operating cost impacts have been well characterized for the basic industries, the effects of pollution regulation on small businesses, as well as on new enterprises, have not been as well identified. There is evidence that the "grey iron" foundry industry and the electroplating industry have been very seriously damaged by environmental regulations. Other manufacturers, as noted in a Business Roundtable study, are experiencing unnecessary regulatory costs that are deterrents to job creation and that add to inflationary pressures.

There is even less information concerned with the impact of environmental regulations on the formation of *new* businesses. A specific case study furnished by a member of the panel suggests and these effects may be significant (George S. Lockwood, "Some Causes and Consequences of Declining Innovation").

The market opportunity represented by the demand for pollution control equipment has resulted in expansion in those industries involved in manufacture of specialized pollution control equipment. Consulting services to provide expert advice, together with engineering and construction firms, have also experienced growth.

Relationship of the Innovative Process to Industrial Growth

For purposes of discussion, the innovative process may be considered as having four sequential phases:

1. *Generation* of a reliable body of scientific and technical knowledge and concepts.
2. *Synthesis* of the perceived need into the necessary know-how to create useful goods. This is done by defining problems and creating solutions.
3. *Demonstration* in a practical way of the functional utility and economic viability of the concept formulated in the second step (that is, a proof of technical feasibility, economy, and market acceptance).
4. *Diffusion* and widespread application of the idea, eventually tapering to the rate of industrial growth.

For the process to work effectively, adequate resources of time and money must be available. Particularly in the basic industries, the demonstration step tends to be extremely costly, partly because of the capital intensive and extensive nature of these industries. Thus, factors which tend to constrain or crowd out capital availability will adversely affect the innovative process. Since present U.S. environmental policy has been demonstrated to have such effects, innovation must be inhibited.

Nor is inhibition solely limited to economic factors. Given the exceedingly tight time constraints frequently mandated by law, solving environmental problems preempts use of technical resources which would otherwise be devoted to product and process improvement. Qualitatively at least, innovation in the material conversion industries is restricted by resource availability, including capital and manpower.

As pointed out in Lockwood's paper, the same impacts can be even more apparent in entrepreneurial ventures which are generally severely limited both in manpower and money in their early years. The fact that 50 percent of U.S. employment is provided by small businesses emphasizes the importance of their contribution to the creation of new jobs in the United States.

The Tradeoff Between Emission Reduction and Improvements in Health and Welfare

The basic premise of the national emission and effluent reduction policy is that U.S. health and welfare will be improved as pollution is reduced. In general, about 80 percent of the benefits from a given level of pollution reduction are attainable for about 20 percent of the cost. That is, the cost increments for the last few percentage points of removal increase very rapidly. This suggests that in the absence of water or ambient air quality-limiting conditions, effluent reductions in existing plants should be set at levels somewhat short of the best available technology if current technology is not to be prematurely discarded with great capital writeoffs.

be significant (George S. Lockwood, "Some Causes and Consequences of Declining Innovation").

The market opportunity represented by the demand for pollution control equipment has resulted in expansion in those industries involved in manufacture of specialized pollution control equipment. Consulting services to provide expert advice, together with engineering and construction firms, have also experienced growth.

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imize public participation when it is most useful. The overall timing could perhaps be shortened if later, disruptive, intervention and lawsuits were reduced as a result of the more timely involvement of the public.

Because regulations often involve highly specific aspects of a particular industry, more cogent responses to proposed regulations might be obtained if the draft regulations were formally circulated to companies and trade associations in the industry involved. This would have the effect of ensuring that the proposals come to the industry's attention in a more sure and timely manner than if the proposals are simply printed in the *Federal Register*. Circulation to trade associations would facilitate joint responses from an industry where this might be appropriate.

Conclusions

The foregoing discussion has attempted to identify the principal effects of present environmental regulatory policy on the private, nonresidential manufacturing sector of the U.S. economy and, in turn, relate these effects to the functioning of the innovative process. Certain broad conclusions can be drawn and these, in turn, can lead to specific policy recommendations.

1. The net impact of environmental regulation on productivity and economic growth in the industrial sector of the U.S. economy is *economically* adverse, though whether the public benefits of health and welfare are worth the cost is an entirely different question not addressed in this report.

2. The adverse effect is concentrated in that category of the industrial sector which can be characterized as basic industries—those segments of industry concerned with conversion of natural products into intermediate forms. These include: electric utilities, pulp and paper, steel, chemical processing, oil, and copper, lead, and zinc. Although data are lacking, the effects identified in these six large basic industries probably also impact industry in general and small business and entrepreneurial ventures possessing similar characteristics.

3. The principal impacts of regulation on innovation are not direct and are caused by the need to allocate resources which would otherwise be used for replacing and modernizing plants and the creation of new business enterprises, to solving mandated environmental requirements.

4. National environmental policy as reflected in current laws and regulations tends to lead to regulatory overkill. Some of the reasons for this are: (a) Use of statistical and epidemiological data to derive environmental standards, (b) reliance on emission reduction as the primary means of achieving environmental quality standards, (c) setting standards based on a "worst case" approach, and (d) basing standards on detailed operating requirements as well as performance requirements.

Policy Options Recommended for Further Consideration

The panel believes that the adverse effects of regulation on the innovative process can be substantially alleviated *without* significantly compromising the goal of a cleaner environment in which to live. Specific policy options that should be considered in creating a better balance between a healthy climate for innovation and a healthy environment for living are noted below.

1. Help prepare more innovators by support of education and research in universities and other educational institutions.

Although national policy already provides support through construction grants, student scholarships and loans, and research grants, additional support of those fields of learning likely to be productive of innovation appears warranted.

2. Increase the knowledge base by encouraging existing national laboratories and agencies to:

- Study the dynamics of transformation and ultimate fate of pollutants in the environment,
- study the relationships between pollutants and health,
- develop and disseminate methodology of risk/benefit analysis.

The recommendations are all aimed at increasing the knowledge base (the second step of the innovative process). Advisory reports have repeatedly recognized the lack of basic knowledge underlying standards and regulations. The recommendation suggests increasing the resources and priority allocated to these tasks using *existing* national capabilities residing in the complex of national laboratories, including those managed by EPA, DOE, Commerce and HEW.

The notion of acceptable risk versus benefit is central to almost all national policy decisionmaking simply because there are insufficient resources available to provide for a zero-risk policy, whether it be national defense, health or public welfare.

3. Increase availability of discretionary funds to the most severely affected segments of industry by:

- encouraging intercompany development of pollution abatement technology
- Federal tax credits, subsidies, and incentives
- direct providing of Federal funds.

The first recommendation stems from the inhibitions to the innovative process brought about by overzealous interpretation of antitrust laws.

The second recommendation has often been advanced and the pros and cons are generally well understood by the Congress. The Advisory Subcommittee on Economic and Trade Policy has responsibility for recommendations in this particular area.

The third recommendation suggests shifting the primary burden for capital formation for pollution abatement to the public sector by means of either direct grants or long-term loans. Such a policy has many attractive features—it would free private resources for innovation leading to productivity improvements; it should reduce much of the costly legal confrontation now prevalent; and by bringing the costs and benefits

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comment

OF THE PUBLIC
INTEREST
SUBCOMMITTEE ON
ENVIRONMENTAL,
HEALTH, AND
SAFETY REGULATIONS

industrial
innovation

innovation

Comment of the Public Interest Subcommittee on the Report on Environmental, Health and Safety Regulations

The basic premise of the report of the Industrial Subcommittee on Environmental, Health and Safety Regulations is that regulations are a drag on the imagination and entrepreneurship of business. The report claims that regulations divert corporate resources from innovative paths. It implies that regulation has transformed the business climate so that it is now too "risky" to pursue new lines of industrial enterprise. In short, the report appears to be subtly asking the public to absorb more environmental, health and safety risk while at the same time asking the Government to insulate business from the risks of managerial "mistakes" and corporate responsibility—all in the name of promoting innovation.

The Industry Subcommittee identified eight ways in which they judged regulations to have "a severe negative impact on the industrial innovative process and its important result, increased industrial productivity." These perceptions of regulation, which are similar to those voiced by business in many other forums, are one of the most critical problems in our society today. Such perceptions provide too easy a scapegoat. They provide an excuse for corporate inaction, a reason for ignoring what business management itself might do, independent of government action to give priority to innovation consonant with people's health and safety.

Yet these perceptions are just that—perceptions. The Industry Subcommittee did not provide any body of documentation as to the magnitude and frequency of the impact that they claim regulation is making. By frequent repetition, it has become folk wisdom to say that regulations are impeding innovation. The Public Interest Subcommittee would seriously question public policy made on such grounds. We thus see it as our duty to raise questions about the eight negative impacts postulated by industry.

Do Regulations Divert Capital Expenditures from Productive to Nonproductive Assets?

Industry argues that defensive research and compliance with government regulations are nonproductive activities. The term "nonproductive" is laden with negative connotations. Surely the industrial community does not mean to imply that it is more "productive" to operate a mine without safety controls.

Health, safety and environmental investment produces very important benefits—health, safety, and environmental quality. The public has clearly indicated that it wants this type of benefit. We must change our conventional definition of productivity to reflect these benefits. Professor Carolyn Shaw Bell has pointed out that changing the definition of industrial output and GNP—and therefore productivity—to include the benefits of better health and increased safety that vigorous regulation could provide would also change perceptions of the economy and therefore economic behavior. A disparity has certainly grown up between our evolving cultural and legal definition of "good" business performance, which includes health and safety, and the economic indicators that we have traditionally used to measure that performance. In the judgment of the Subcommittee, rectifying that discrepancy would go a long way toward reducing the level of acrimony in the debate about regulation.

Even using the conventional definition of productivity, there are problems with the claim that it is regulation which caused capital expenditures to be diverted from productive to nonproductive assets. There has indeed been a lag in capital spending in the United States when measured by a variety of criteria. But the role of regulation in that lag is questionable.

Before accepting such a proposition, one must consider the totality of funds available to corporations and the way they allocate those funds.

Business Week reported in September, 1978 that the country's biggest corporations have at their disposal, "a record $80 billion pile of ready cash." But, the article continues, they are reluctant to spend this money for long-term commitments because of a "profound lack of business confidence in the national and international economic outlook. . . ." But some of these funds are being used by companies to acquire other companies. This rash of mergers in which business is currently engaged drives up stock prices and artificially inflates the book value of the acquired businesses without adding a whit to productivity. Mergers are indeed nonproductive investments.

Moreover, all expenditures which are classified as research and development are not productivity enhancing and never have been. Just consider the auto industry. It is appropriate to recall that, as Ford Motor's Vice President, Donald Frey (the present chairman of this Industrial Subcommittee) recognized the problem of the lack of innovation in the auto industry. In an address he delivered in 1974 he said "I believe the amount of product innovation successfully introduced into the automobile is smaller today than in previous times, and is still falling." "The automatic transmission, adopted in 1939 on a mass production basis, was the last major innovation of the industry." Henry Ford agreed with that statement then, and has just recently reiterated that agreement.

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processes to the market. They point out these delays deny the public rapid access to the fruits of innovation.

Careful scrutiny to prevent some of the large scale environmental and health disasters we have suffered in recent years does take some time. But we may never know what disaster a little extra consideration and testing averted. The benefits are difficult to assess.

If delay is such an important concern, however, it is appropriate to also look at industry's own delay. A substantial portion of the delay involved in regulation is caused by industry—fighting, delaying and obstructing implementation and compliance. The development and implementation of standards by EPA and OSHA have been accompanied by deluges of studies, experts, papers, and testimony by industry arguing that whatever action the agency was considering was not necessary. Rarely has there been any recognition of corporate social responsibility. Rarely has there been recognition of the intolerable level of social costs produced by industry which gave rise to a public outcry and thus the regulatory legislation. A spirit of cooperation from business in attaining publicly mandated goals would go a long way in reducing the delays associated with regulations.

Does Uncertainty Impede Innovation?

In addition to delays, the industry complains about uncertain standards, which they say increase investment risks. Some uncertainty is inevitable, both because the process of regulation is relatively new and because there are gaps in our knowledge about the substances being regulated. As the state of knowledge progresses, standards do have to be adjusted on the basis of that new knowledge. It must be noted that business lives with and even thrives on a wide variety of uncertain factors. There is uncertainty about economic conditions and uncertainty about crops, uncertainty about trade and foreign exchange, and uncertainty about politics. Business will have to live with this type of scientific/regulatory uncertainty as well.

Again, it must be pointed out that industry actions also play a role in this uncertainty. Industry's adversarial posture delays final decisions and final implementation of standards, prolonging the period of uncertainty.

The Public Interest Subcommittee recognizes that such uncertainty, whatever its source, may tend to channel investment away from innovations in areas susceptible to imminent regulation or changes in standards. This may be a problem, but, on the other hand, it may be a benefit.

In the toxic substance area, for example, where our knowledge is growing but as yet incomplete, there is a great deal of regulatory uncertainty. Would it not be a benefit to society to slow down the rate of innovation involving potentially toxic substances? Does society really benefit from the introduction of over 3,000 new chemicals for commercial use next year, to add to the 70,000 already in use? It is beneficial to have the rate of innovation overtake our ability for assessment? The direction of innovation is the critical issue. Regulatory uncertainty, in areas where knowledge is insufficient to allow certainty, may be a beneficial means for channeling and influencing the direction of innovation away from potentially harmful products and processes.

Do Regulations Pose Special Problems for Small Business?

The Industry Subcommittee expresses concern for the especially heavy impact of regulation on small businesses, since small business has been shown to be the major source of innovation in our society. The Public Interest Subcommittee shares some of that concern. The individual report of the Public Interest Subcommittee devoted substantial consideration to the problems of small businesses, and made the following recommendation, among others: "Where it can be shown that regulations actually place an undue burden on small businesses, the Federal Government should provide grants and coordination assistance for the purpose of developing compliance technology of the appropriate scale."

The Public Interest Subcommittee would also support a proposal such as the following one by John Kenneth Galbraith:

> All regulatory policy should have categories. And without retreat on regulatory objectives, there should always be consideration of cost and reporting requirements for the small firm. By treating large and small alike, one treats them differently. (Quoted in "Future of Small Business in America," House Committee on Small Business.)

But we would remain vigilant lest the special needs of small business be used as a shill for a generalized attack on regulation.

Is Trade Secret Information Inadequately Protected?

The industry report contends that regulatory agencies do not give adequate protection to the proprietary information they submit for compliance purposes. Since that accusation has little to do with innovation, they add the complaint that agencies are refusing to acknowledge the right of industry to place a confidentiality claim on the development of innovative new manufacturing processes and products.

The current law protects proprietary information, even to the point of a prison term for the government official who erroneously releases it. This then is not the issue. The issue is just what information can be reasonably considered proprietary under the law. And for the purposes of this Domestic Policy Review, the issue is whether there is any evidence that innovation has been impeded by the release of information which either is or is not protected by law.

Again, there is no proof offered to back industry's preceptions. This report contains no "horror story" list of the damaging effects of the release of information. We invite submission of such instances, agency by agency and company by company.

Industry's real concern here appears to be something other than innovation. Perhaps it is reluctance

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do not turn their vast capabilities in such environmentally helpful directions more frequently and, eventually, make such efforts a way of life.

Why, we ask, does there have to be a conflict between a priority on innovation and a priority on health and safety?

We are sure that the industrial leadership of this country is smart enough to accomplish both in the public interest. There is no necessity for workers to have to choose between their health and their job. Community residents need not put their health on the line for living where they do. It is a matter of creativity, effort, and will.

Corporate Responsibility

What is missing from this report is any recognition of the role business has played in creating the perceived dilemma between health and safety on the one hand, and innovation on the other. By holding to past business practices, and by failing to adapt to new political and scientific realities, it has worked itself into a position which it perceives to be quite uncomfortable. In asking the Government, in this report and elsewhere, to relieve its discomfort—by underwriting corporate risk with public money, by giving "economic" considerations, as they would define them, priority over considerations of health and safety, and by substituting corporate judgments for those of the public and Government—business has displayed both moral and political insensitivity.

The report harks back to the days of "prudent risk taking, based on scientific judgments, in which innovation has always flourished." It regrets that "substances that have been used safely for years are being called into question because of the new discovery of minute toxic properties." We look in vain for recognition in this report that the cancer death rate in the United States has nearly tripled since 1900. According to HEW, 40 percent of cancer is related to the workplace and we do not have any idea how much is related to our environment. Risk taking may have been "prudent" for business profits, but it wasn't for workers or citizens of neighboring communities, the ultimate victims.

We look in vain for recognition in this report that today the production of waste and pollutants has overwhelmed natural healing systems in the environment. Today, there are 70,000 chemicals in commercial use and 3,200 new ones are introduced into commerce each year. The National Institute for Occupational Safety and Health lists some evidence of toxicity for about 13,000 of the chemicals in current use, and 1,500 to 2,000 are suspected carcinogens. And today we understand the dangers better than we did before.

Business has made little effort to recognize its responsibility as dangers were uncovered, or to protect society against these dangers on a voluntary basis.

The plea for greater corporate social responsibility is by no means limited to Public Interest groups and government officials; it is being prominently expressed by senior corporate officials themselves. "Large corporations," states John W. Filer, chairman of Aetna Life and Casualty, "can no longer be single-purpose institutions directed solely to economic results. All must . . . be visibly attentive to the Public Interest *as the public views it.*" Walter Haas, chairman of Levi Strauss & Co., argues that "today's corporation must develop practical means of giving human needs *the same* status as profit and production . . . in the long run, this new task of the corporation will be in its own best interest, since it cannot prosper as fully or as long in a society frustrated by social ills and upheaval." And in April of this year a group of prominent business leaders and others, meeting under the auspices of the American Assembly, issued a commendable statement calling on American corporations to become more responsive to social concerns.

In the view of the Public Interest Subcommittee, there need be no conflict between regulation and innovation. If corporate managers routinely took into account the human, environmental and social effects of their actions and if corporate ingenuity was directed in socially beneficial ways, then no conflict would exist. Human, environmental and social needs would be met by innovative products, processes, and solutions. In a climate of lively innovation to meet those needs, the public demand for new regulations to provide protection from corporate actions would subside, a situation which clearly would please business.

The Public Interest Subcommittee would endorse and echo the comments of Secretary of Commerce, Juanita Kreps in recent congressional testimony. Secretary Kreps pointed out that the demand for regulation is dictated by a range of problems that we have to correct, and, moreover, every industry leader agitated about "government intrusion" should understand that the business community cannot demand less regulation by Government without at the same time addressing the social ills that created them in the first place.

She said, "To the extent business helps (through improved corporate social performance) to deal with issues that might otherwise prompt government regulation, it serves its own economic interest."

We can add that it also serves the health and safety and happiness of the American people. With a humane hand at the wheel, there is every reason to believe that these two objectives can be joined effectively in the public interest.

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INDUSTRIAL ADVISORY SUBCOMMITTEE REPORT ON REGULATION OF INDUSTRY STRUCTURE AND COMPETITION

industrial innovation

Domestic Policy Review of Industrial Innovation

Report of the Industrial Subcommittee on Regulation of Industry Structure and Competition

This subcommittee report was prepared based on contributions of the following members (M) and their supporting staff:

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J. C. Masson	
E. S. Brower (M)	Allied Chemical
Gary Luick	
J. E. Steiner (M)	Boeing Co.
Robert George	
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R. J. Schoerner (M)	Southwire Co.
Herbert Browne	
Glen Travis (M)	Wentzway Corp.

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accelerate the innovation process—while preserving the principle of appropriate regulatory oversight of the Nation's economic machinery.

A NEW VIEW OF ANTITRUST POLICY

Standing as a cornerstone of American economic policy is its body of antitrust law. The principle underlying that body of law is the support and protection of true competition. Where innovation has been stimulated by antitrust policy, the country has richly benefited.

Where it has not, particularly at this critical juncture in economic history, antitrust policy must be recast to accommodate a whole new set of worldwide and domestic realities.

In specific terms, the Subcommittee concluded that Government must carefully reexamine foreign competitors' actions within the domestic economy—reexamine them against the same standards applying to U.S. companies. Joint research activities and acquisitions in the domestic market by ex-U.S. firms, each demand study and change.

Likewise, new thinking is in order that would reward not penalize competitive advantage achieved through innovative actions—rewarding growth through the creation of new technology as opposed to growth by financial or economic force.

A wholly new scale of antitrust values must be placed upon achieving significant technological breakthroughs by joint efforts and aiding small advanced technology businesses reach their greatest economic potential through merger with larger units.

Each of these issues within a proposed new framework for antitrust policy is examined and illustrated in detail in the accompanying report.

RECOMMENDATIONS FOR ACTION

In the body of the accompanying report will be found seven specific issues relating to the impact regulatory and antitrust actions have upon industry structure and competition.

Each is followed by detailed courses of action recommended and is illustrated with examples and references to actual experiences, for the most part witnessed by Subcommittee members.

In advancing these findings for consideration within the Administration's total Domestic Policy Review, the Subcommittee expresses its joint commitment with the President and his Administration to do all within its power to help restore the appropriate climate for heightened innovation. And it further joins with the Administration in its efforts to ensure the long-term economic strength and viability of America, at home and abroad.

Issue No. 1.—Inconsistency of Regulation Reduces Innovation

Changing objectives or uncertain standards of regulation, as well as uncertainty in the methods for measuring compliance, act to slow innovation. When regulation by the same or different regulatory agencies is contradictory or when standards or methods of measuring compliance are not stabilized for an appropriate time period, many firms are not willing or able to accept the risk of committing resources to potential innovations. The net effect is to reduce competition.

RECOMMENDED ACTION

1. Each regulatory agency should issue a long range statement of regulatory intent that could serve as guidelines for both the agency and the regulated. This statement of intent should require appropriate notice prior to any changes to accommodate the long-range planning of the regulated.
2. Whenever two or more agencies are developing regulations or policy on a single issue or interdependent issues, an interagency coordinating committee should be formed to assure consistency.
3. Where a single industry or company within that industry has related compliance requirements controlled by more than a single law, interagency and intra-agency consultation must occur to ensure consistency between and within agencies.

Illustrations of "Inconsistency of Regulation Reduces Innovation"

Example No. 1.—Based on years of research, a chemical company developed a plastic beverage container suitable for soft drinks. The plastic was a copolymer of styrene and acrylonitrile. The advantages of the container were its light weight, convenience, safety, and recycleability. In the development stage, extensive data was submitted to the Food and Drug Administration showing that under intended conditions of use, no acrylonitrile could be detected migrating into the bottle contents. In February 1975, FDA issued a Final Regulation setting forth the conditions under which acrylonitrile "may safely be used in soft drink bottles."

Following FDA approval, the manufacturer and a major soft drink firm committed considerable resources and effort to the introduction of this wholly new packaging concept. Consumer tests quickly endorsed the lightweight, shatter-resistant plastic bottle by a 3 to 1 margin. New manufacturing capacity was added to keep pace with consumer demand.

An interim technical report on chronic toxicity tests on rats showed an excess of tumors in rats fed acrylonitrile. Concurrently FDA tested the plastic bottles under exaggerated conditions and concluded that acrylonitrile could migrate into the contents. Based on these data, FDA suspended the approval of the bottle as a soft drink container. Despite several legal challenges, the ban is still in effect.

As a result of the action, approximately 1,000 people were laid off and the company incurred a loss of approximately $100 million.

Example No. 2.—Capital formation is also adversely affected by the uncertainty about the future of regulations governing the introduction of new processes and products. Take this example from the energy area.[1] A

[1] Synfuels Interagency Task Force, *Recommendations for a Synthetic Fuels Commercialization Program*, Report submitted to the President's Energy Resources Council, vol. 1, Washington, Government Printing Office, 1975, p. 134.

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standards with low sulfur coal. It also directly impacts the competition and structure of the coal industry. In the eastern part of the United States, low sulfur Appalachian coal had a price premium related to the cost savings of consumers who could meet environmental requirements without installing scrubbers. BACT eliminated this premium since all users were required to invest in scrubbers regardless of the level of sulfur emissions. Those coal companies who owned low sulfur coal reserves lost their competitive advantage. The owners of high sulfur coal reserves had their competitive positions protected with clear implications for industry structure.

For the midcontinent area, BACT resulted in lower demand for low sulfur western coal and higher demand for the cheaper high sulfur midwestern coal. The estimated impact of BACT in the industrial sector (i.e., excluding utility coal consumption) is that over 60 million tons of coal per year which would meet the previous emission level of 1.2 lbs./million BTU would require scrubbing at an estimated increase cost to the Nation of between $1 and $2 billion per year. The full cost to the Nation, which would include the cost of utility as well as industrial coal scrubbing, would be even greater.

The combination of mandatory coal use and BACT thus effectively blunted the competitive inroads of low sulfur coal on the coal industry, with the majority of the impact being lower production of western coals. Since, in general, western coal is not owned by the large, old line coal companies, one of the impacts of BACT was to limit the structural change toward lower sulfur coals and the companies who own such reserves. As such, it tends to freeze the existing industry structure to the detriment of new entrants into the coal industry.

Example No. 2.—The following example will serve to illustrate the negative aspects of the adversary relationship between regulators and the regulated.

OSHA regulations incorporate a philosophy of "first instance citation." Under this principle, inherent in the regulations, an OSHA inspector may visit the premises of an employer without notice, cite the employer for violations, and impose fines. In an overwhelming number of cases, the employer had no knowledge of the health or safety violation, and also, in most cases, the employer would have voluntarily corrected the violation had he known it existed.

In general, the philosophy of "first instance citation" seems designed to elicit a violent reaction from any employer.

Eliminating this principle from OSHA regulations and replacing it with the right of an employer to request an OSHA inspection without fear of penalty if violations are corrected in a timely fashion and in good faith, is a small concession which promises rewards by changing the adversary relationship to one of cooperative compliance.

Precedence for this action was just approved by Congress in the form of the Dole Amendment to become effective September 30, 1979, for only those firms with fewer than 10 employees.

The provisions of the Dole Amendment to OSHA are: If an employer requests an OSHA-approved consultant to examine the area in question, and the employer makes a good faith effort to comply with the advice, the employer will not be fined unless there are some serious, willful, or repeated violations or eminent danger present. The principle embodied in the Dole Amendment should be extended to all businesses.

* * * * *

The interface between the EPA and industry relative to the implementation of the Toxic Substances Control Act will serve to illustrate the beneficial effects of Government/industry cooperation. Assistant Administrator Steven Jellinek has made a studied effort to understand industry's position on significant issues involved in the rulemaking process under the law and his staff shows every inclination to operate within such a policy. Of course it must be recognized that public interest groups and Government agencies oftentimes present divergent views and these are given equal consideration. Compromise is generally the result and this should be expected.

The first major regulation promulgated under TSCA was reporting existing chemical substances for the initial inventory. In retrospect this task was accomplished smoothly. Industry was consulted at great length as the rules were being developed and Manufacturing Chemists Association spokesmen joined hands with EPA in giving instructional seminars after the rule was finalized. During the reporting period the EPA industry assistance program was first class.

Currently, the most significant project is finalizing proposed premanufacture notice rules for new chemicals. Months of effort have gone into this and all during the drafting stage the Office of Toxic Substances' staff has made working drafts available to industry representatives for information and informal comments.

Other implementation plans include testing, reporting, rulemaking and the open door policy has also been evident here.

In a speech to the Midland, Michigan section of the American Chemical Society, Mr. Jellinek made the following statement: "In developing the rules and notice forms for the premanufacture program, we held more than 20 informal meetings with representatives of at least 50 individual companies, trade associations, and public interest groups. While this kind of openness and consultation takes more time initially, I believe there is a net savings in time and effort. As a result, I think the quality and acceptability of the proposed rules and forms will be much higher in the long run than they otherwise would have been."

While the current EPA expressed desire for help through informal and open dialogue does not guarantee regulations that are reasonable and not overly burdensome, at least industry can feel that it has had its day in court.

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allocation . . ." [9] subject to various qualifications given in the study.

Due to the uncertainty of both Harbeson's study (due to Boyer's findings) and Boyer's study (his estimate is only an upper bound), this component of the cost of transport regulation will be excluded for the purpose of the present paper. As Boyer states, "The economic costs of regulation may be quite large, but those induced by intermodal traffic misallocation will not be a large component." [10] This, then, contributes to an understatement of the true aggregate cost of transportation regulation.

It should be noted that the "full" costs of regulation are not reflected in these estimates. Besides the values cited in table 1 which could not be estimated, other factors, such as retarded innovation in the trucking industry were not quantified.

Compliance Cost of Regulation in the Transportation Industry, 1969

(In millions of dollars)

Type of Loss	Low	Medium	High
Inefficient use of mode:			
Common carrier trucks	1,400	1,600	1,890
Private trucks	100	200	1,000
Rails	1,700	2,000	2,400
Water carrier	200	300	300
Pipeline	(a)	(a)	(a)
Subtotal	3,400	4,160	5,590
Traffic shifted to alternate mode:			
Trucks to rail	200	1,100	2,900
Water carriers to rails	(a)	(a)	(a)
Pipelines to others	(a)	(a)	(a)
Subtotal	200	1,100	2,900
Traffic not carried	175	300	400
Retarded innovation	12	(a)	41
Deadweight loss	220	(a)	270
TOTAL	4,007	5,560	9,201

(a) Not estimated

SOURCE: The low estimate is based on Merton J. Peck, "Competitive Policy for Transportation?" in Almarin Phillips, editor, *Perspectives on Antitrust Policy*, Princeton, Princeton University Press, 1965, pp. 261–65. Medium and high estimates derived from Robert W. Harbeson "Toward Better Resource Allocation in Transport," *Journal of Law and Economics*, October 1969, pp. 322–34.

Reference No. 2.—ICC regulation of the railroad industry delayed unit trains at least 5 years and delayed full use by the Southern Railroad of the "Big John" cars to carry grain. (Thomas G. Moore, statement before the Senate Subcommittee on Transportation and Aeronautics 92d Congress, serial No. 92–79.)

Reference No. 3.—Interstate trucking provides another cogent example where Federal regulation is in large degree a barrier to entry protecting existing firms against possible new entrants. (Murray L. Weidenbaum, *The Costs of Government Regulation of Business,* Government Printing Office, Washington, 1978, p. 16.) In this case, there is no "in ground" investment to excuse monopoly treatment.

[9] *Ibid,* p. 509.

[10] *Ibid,* p. 509.

Reference No. 4.—(Excerpted from Robert DeFina, *Public and Private Expenditures for Federal Regulation of Business,* Center for Study of American Business, 1977.)

Attempts at estimating the costs of regulation with respect to fares and market efficiency have been undertaken by Jordan [11] and Keeler.[12]

Jordan compares fares of the relatively unregulated California intrastate routes (Pacific Southwest Airlines or PSA) with fares in the northwest corridor which are regulated by the CAB. The study covers the year 1965, in which PSA was subject only to regulation in the form of a maximum fare. In effect, he estimates hypothetical regulated fares for the California market and then compares them with existing fares. His findings show that coach fares for similar interstate markets would have been between 32 percent and 47 percent lower than the CAB-regulated fares which were in effect at this time.

Keeler studied fares for 30 major domestic air travel markets. He developed a long-run airline cost model, and used it to predict hypothetical unregulated fares for the 30 markets. His underlying assumption is that in a free market, the fares charged would equal average cost. The results of his study show that, ". . . as of 1968, regulated routes had markups over the estimated unregulated fares ranging from 20 to 95 percent, with a distinct tendency for markups to rise with distance." [13] Updating to 1972, Keeler states that the markups range from 45 to 84 percent. Jordan's updated figures range from 47 to 89 percent.[14]

Reference No. 5.—(Excerpted from Robert DeFina, *Public and Private Expenditures for Federal Regulation of Business,* Center for Study of American Business, 1977.)

In 1945, the FCC allocated rights to the UHF spectrum to local rather than to regional stations. However, in 1952, technology had advanced far enough to permit reception of UHF signals. The UHF stations were controlled by the FCC with the passage of the All-Channel Television Receivers Act of 1964. Given this control, the commission passed rules so as to protect the UHF stations from the competition of cable TV. There was fear that growth of cable TV would diminish advertiser support for the UHF stations.

Mitchell and Comanor [15] investigated the efficiency loss due to the restricted demand for cable TV. They argue that regulators, acting as economic planners attempt to exploit the monopoly position of cable TV to gain revenue for their activities. In essence, the cable firms would never see their profits due to, say, required income transfers for support of the UHF stations.

As the authors state, behavior of this sort causes social cost, regardless of whether such monopoly profits are used in the public interest. They argue that,

[11] Jordan, W. A., *Airline Regulation in America,* Baltimore, Maryland, Johns Hopkins Press, 1970.

[12] Keeler, Theodore, "Airline Regulation and Market Performance," *Bell Journal of Economics,* Autumn, 1972, pp. 399–424.

[13] *Ibid.*

[14] *Ibid.*

[15] Comanor, W., and B. Mitchell, "The Costs of Planning: The FCC and Cable Television," *Journal of Law and Economics,* April 1972, p. 177.

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of the art. Otherwise, destructive economic penalties occur.

An example of the penalties that can be exacted when this principle is not followed is found in the EPA automobile emission standards, which paid little attention to the combination of state of the art, industry economic viability, and preservation of the U.S. market for U.S. manufacturers.

With the passage of the Clean Air Act of 1970, very stringent standards for automobile exhaust emissions were established. Specifically, the law called for a 90-percent reduction in hydrocarbons and carbon monoxide by 1975, and a 90-percent reduction in nitrogen oxides by 1976.

The U.S. automobile industry with a massive capital investment tied to their current automotive technologies and faced with increasingly high costs of regulatory compliance was not economically able to change technologies that rapidly. Instead, they were forced to attempt incremental improvements in current technologies. Indeed, the automobile companies were never given the opportunity to discuss a rational timetable.

In 1970, the Honda Motor Company of Japan saw an opportunity to gain a competitive edge in the world automotive market if they could develop an engine which would meet stringent U.S. emissions standards without sacrificing fuel economy. Honda management also felt Japan would ultimately follow the United States in instituting strict emission standards. In addition, the Japanese company could no doubt use the financial resources available through the Government-industry cooperative financial program administered at the ministry level for which there is, of course, no U.S. equivalent.

Honda engineers chose for development an engine technology which had been ignored by others because it was felt to have serious drawbacks in fuel economy and nitrous oxide emissions. The company, however, was not constrained by capital already committed to existing technologies as were the U.S. companies, and began research and development work on their new engine. In 1973, Honda introduced to the Japanese market the CVCC engine. Since Japan had not yet instituted emission regulations, Honda had the opportunity to further refine and perfect the new engine in an unregulated market. In 1975, the engine was introduced to the U.S. market successfully meeting emissions requirements while maintaining fuel economy. Recent tests reportedly suggest the CVCC engine is superior to competing engines of similar size in both fuel economy and emissions characteristics.

In 1977, the United States imported nearly a quarter of a million Honda automobiles. It is evident in the case of the CVCC engine development that U.S. regulation stifled rather than fostered technological innovation in the United States while allowing foreign competitors an entry to U.S. markets. The result has been loss of U.S. sales and market position. This is a dramatic example of the need for impact studies such as would be required under Recommended Action (3).

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There are good examples of regulation development in some of the more experienced Federal agencies. One such would be the preparation of aircraft community noise standards. In this case the Federal Aviation Administration (FAA) conducted a multiyear study to determine the maximum noise reduction technically feasible within the aerospace industry, using representatives of that industry in a formalized "commenting" role. The result was FAR 36 which, in 1968, imposed severe, but technically feasible, standards on new design aircraft. These standards were then later extended to all new airplanes of older design, allowing time for incorporation without presenting insurmountable economic impact to the airlines or technically unachievable hurdles to industry. More recently, an even more severe set of standards, FAR 36, Amendment 8, have been similarly evolved for new design aircraft. The total process has been an example of responsible regulatory action which forced industry to spend many millions of dollars on noise reduction R. & D., but paced the progress of noise reduction to make sure that the economic viability of the industry was retained and that its international competitive position was not destroyed.

Issue No. 5.—Costs of Regulation Lead to Increased Market Concentration

Smaller firms, historically the source of significant contributions to innovation, suffer disproportionately greater injury from the overall costs of regulations than do larger firms.

Inequitable burdens of compliance costs on small businesses to meet OSHA regulations have been recognized by recent legislation wherein businesses with fewer than 10 employees have been given special relief.

Serious inequities in compliance cost impacts also occur within the very largest industrial corporations. For example, a risk analysis of the fuel economy regulations in the automobile industry clearly demonstrates an adverse impact on the top four domestic automobile manufacturers. More important, the conclusion reached after a complicated modeling of the many variables affecting the financial performance of these top four automobile manufacturers, when projected to 1985, indicates that imposing the mandated fuel company standards will hurt AMC and Chrysler more than GM or Ford.

Coincident with our country's declining innovation vis-a-vis other nations, there has been a dramatic reduction in the capital invested in small and intermediate size businesses as compared with the total invested capital in businesses of all sizes.

In 1956, the total stockholders' equity of manufacturing corporations under $50 million in assets was 1.3 times as much as the total of corporations with assets of $1 billion and over. By 1975, the situation had dramatically reversed with stockholders' equity of those corporations with over $1 billion in assets becoming 3.1 times the total of those corporations under $50 million.

There are at least three major causes of this trend:

- Hundreds of smaller firms have had to close due to costs of compliance of new regulations and,

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contains uranium, used in nuclear reactors; columbium and tantalum used in steel to improve metallurgical; and, yttrium used in color TV tubes.

Imports of ferro columbium, a by-product used in high temperature super alloys, increased 55 percent in 1974. There is no domestic production of columbite-tantalum. Despite this, a major portion of these euxenite deposits will be withdrawn for exploratory mineral entry by the Fish and Wildlife Service in January, 1979, under Sec. 204(e) of Public Law 74–579 (BLM Organic Act). This example demonstrates that lack of economic impact studies allow regulations to force imports of critical materials.

The survival of Excel Mineral in the face of a plethora of social regulations demonstrates the stamina needed to overcome regulatory obstacles. The effects of regulations implemented without carefully counterbalancing social objectives with economic reality can be disastrous to smaller firms.

Issue No. 6.—Antitrust Policies Can Inhibit Innovation

The antitrust laws do not directly address innovation. Rather innovation is generally stimulated by competition. In general, antitrust policies which foster competition* tend also to promote innovation. Insufficient attention, however, has been given by the Congress, the antitrust enforcement agencies and the courts to the converse proposition: Antitrust policies which discourage innovation are, to that extent, inherently anticompetitive.

Innovation itself is inherently a high-risk proposition: the costs are substantial, the prospects uncertain; by definition, it involves the unknown. When other risks (such as the risk of provoking antitrust actions) are superadded to the equation, or when the prospects of reward is undully circumscribed, the scales may tip toward the safer course of risk avoidance. Moreover, because the antitrust rules are necessarily imprecise, the business decisionmaker has difficulty in assessing the likelihood of adverse action or the magnitude of exposure. This compounding of legal, technical and economic uncertainty may in some cases prove fatal to the innovation.

* * * * *

RECOMMENDED ACTION

1. Market share acquired principally as a result of the introduction of new technology should not ordinarily be considered in monopolization cases. Proposed "no-fault" monopolization legislation which would preclude consideration of the extent to which market share has been acquired as a result of technical superiority would strongly discourage leading firms from promptly introducing new technology and from passing on technology-based cost savings through price reduction.

2. While the conduct of research projects on an individual firm basis, or among firms which are not competitors, is ordinarily to be preferred, the Department of Justice should explicitly recognize that there are certain areas in which joint or cooperative research, even among large competitors, should be encouraged. This is particularly true in the case of high-cost, high-risk "breakthrough"-oriented projects. The generally procompetitive long-term effects of major innovation (as well as its benefits for the national economy as a whole) should ordinarily be given great weight. In such cases, the participants should be permitted wide latitude in allocating the intellectual property rights and other benefits which are the products of the research, where such allocations are in fact ancillary to, and supportive of, the legitimate purposes of the research.

3. Issues related to innovation should be given great weight in cases involving the acquisition of small, advanced-technology firms by established firms in similar or related fields. Where the impact of such acquisition upon the broad-scale implementation of new technology would not be favorable as compared with other realistic alternatives (e.g., expansion of the small firm through venture capital or other financing, acquisition by firms in unrelated fields, etc.), enforcement action is appropriate. However, the enforcement agencies should explicitly recognize (a) the possibility that, in a given case, such an acquisition may hasten the broad-scale implementation of new technology, and (b) the fact that the prospect of acquisition is one of the most important incentives for entrepreneurs in organizing new firms to exploit novel technology. Overly rigid limitations on the options available to small, advanced-technology firms are likely to have an important negative impact upon the development and implementation of new technology.

Issue No. 7.—American Market is But a Component of the World Market—and Must be so Perceived by Antitrust Authorities

The American market has increasingly become part of an international market. This development profoundly affects the interests of Americans both as producers and consumers. Antitrust policies have been slow to recognize the extent and significance of this development, and particularly the relative erosion of American technical and cost leadership.

* * * * *

RECOMMENDED ACTION

1. The Administration should initiate an intensive study, to be completed within 1 year, to determine (a) the extent to which foreign firms engage in practices which would, if subject to American jurisdiction, violate the fundamental principles of the Sherman Act (e.g., market division, concerted strategies, use of monopoly

* The word "competition" is taken here in its most meaningful and realistic sense, as all forms of behavior by firms to increase their profits by gaining economic advantage over their rivals, through reducing costs, new or improved products, or new or improved technology. In some quarters, such as the FTC, the meaning of "competition" is limited to the condition of an industry such that no single firm is large enough to have any market power. This latter special meaning of the word obscures the basic processes by which firms seek to gain competitive advantage and which result in benefits to the consuming public.

Note: Professor Victor H. Kramer, Georgetown University Law Center, a member of this subcommittee dissents from recommendations 1 and 3 as follows:

"Although I agree with many of the recommendations in our report relating to antitrust, the implications of some of them would require amendment to the Sherman and Clayton Acts with which I disagree."

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sidered: To the extent that existing antitrust policies constitute a "self-imposed trade penalty,"[1] then the costs and benefits of that penalty plainly require consideration.

Reduced to their essence, the Subcommittee's recommendations ask the Congress and the executive branch, in formulating antitrust policies, to recognize the complexity and fragility of the innovation process; and to give greater consideration to the unintended impacts of those policies upon innovation.

Issue No. 6

In general, antitrust policies which foster competition tend also to promote innovation. Insufficient attention, however, has been given by the Congress, the antitrust enforcement agencies and the courts to the converse proposition: Antitrust policies which discourage innovation are, to that extent, inherently anticompetitive.

General Recommendation

The Congress and the antitrust enforcement agencies should consider issues related to innovation as a major factor in formulating statutory and enforcement policy. In particular, explicit consideration should be given to the impacts of existing and proposed policies upon the innovative process.

Discussion.—This Recommendation parallels that of the Charpie Report of 1967:[2] The Subcommittee sees little evidence of its implementation in the intervening years. The innovative process is a lengthy, complex and delicate one. A wide range of factors must be present—and present at the right times—to result in a successful outcome.[3] At each stage in this process, decisions must be made by individuals and firms on the basis of their evaluation of risks and rewards. To the extent that antitrust policy, as perceived by the people who make those decisions, affects that evaluation, it will correspondingly affect innovation itself.

That is not to suggest that, in each case, the objective of innovation is to be preferred, as a matter of policy, over the objectives of antitrust enforcement. Rather, it is only to urge that both objectives be explicitly considered and, when possible, reconciled.[4] Indeed, to the extent that innovation is understood as generally procompetitive in its purpose and effect, the support of innovation should be recognized as both a goal and a resource of antitrust policy.

To say that innovation-related issues should be given major consideration in the development and enforcement of antitrust policies may perhaps be viewed as fatuous. It is certainly true that such statements provide no touchstone for resolving complex issues. On the other hand, there are many important statements of policy and law which appear to be equally abstract: They gain their meaning in the context of good faith efforts by private parties, government agencies and courts to apply them to concrete cases. The questions are ultimately ones of degree, and it is presumably the fundamental purpose of this Domestic Policy Review to focus a greater degree of attention on innovation-related issues. While the point is not susceptible of hard proof, it is the view of the Subcommittee (a) that there is ample room in practice for greater attention to these issues, and (b) that greater emphasis on these issues will produce genuine improvements in the environment for innovation.

The following specific recommendations illustrate some of the areas in which the Subcommittee believes improvements are both possible and highly desirable.

Specific Recommendations

1. Market share acquired principally as a result of the introduction of new technology[5] should not ordinarily be considered in monopolization cases. Proposed "no-fault" monopolization legislation which would preclude consideration of the extent to which market share has been acquired as a result of technical superiority would strongly discourage leading firms from promptly introducing new technology and from passing on technology-based cost savings through price reduction.[6]

Discussion.—Innovation and relative technical excellence tend to increase relative market share, either by the superiority of the end product or by providing cost advantages which can be translated into price advantages. To the extent firms view increasing their market share through these means as creating antitrust exposure, the risk/reward ratio will have been skewed against the introduction of new technology.[7]

There is some reason for concern that this is already the case. Business executives may understandably have difficulty in distinguishing between that vigorous competition for market share which is presumably desirable, and the resultant success in that competition which, when characterized as "dominant" market share, subjects their firms to governmental and private attack. While extended discussion of that widely perceived paradox is beyond the scope of this REPORT, its

[1] J. C. Abegglen and T. M. Hout, *Facing Up to the Trade Gap with Japan,* Boston Consulting Group, Inc. (1978), p. 22.

[2] *Technological Innovation: Its Environment and Management,* U.S. Department of Commerce (1967), Recommendation 12 at p. 52.

[3] *See, e.g., Technological Innovation: Its Environment and Management,* Department of Commerce (1967); J. M. Utterback, "Innovation in Industry and the Diffusion of Technology," *Science,* (February 15, 1974) pp. 620-626; *The Role of New Technical Enterprises in the U.S. Economy,* Department of Commerce (1976); *Interactions of Science and Technology in the Innovative Process: Some Case Studies,* National Science Foundation (1973).

[4] In this connection, the recent emphasis on the analysis of the costs, as well as the benefits, of regulatory action generally has direct applicability to the antitrust field. *See, e. g.,* remarks by Barry P. Bosworth, Director, Council on Wage and Price Stability, *The New York Times,* December 6, 1978, p. D4.

[5] In this context, new technology should include product, process and service innovation. Technology which affords a cost advantage and thereby contributes to markets share also falls within this category.

[6] See, *e.g.,* Statement by Albert F. Dougherty, Jr., Director, Bureau of Competition, Federal Trade Commission, before the National Commission for the Review of Antitrust Laws and Procedures (October 19, 1978). Mr. Doughterty's proposed "Section 2A" of the Sherman Act would limit any defense of technological superiority to that technology which is protected by patent rights.

[7] In the case of cost-reduction innovation, a firm can, of course, introduce the innovation while maintaining preinnovation pricing and, therefore, hold market share constant. The result is higher profit to the firm without benefit to consumers. While, in the absence of antitrust considerations, a firm might adopt such a strategy in any event, it makes little sense for antitrust policy to encourage that result.

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nature of important "break-through"-oriented research typically combines extremely high costs with highly uncertain prospects for success. That such research be undertaken is, of course, a desirable social objective, but it is precisely this kind of research which individual firms (even major ones) may avoid or pursue on a small scale, preferring less ambitious projects with greater likelihood of short-range success.[13]

It is widely felt that, particularly in the case of large companies, existing policies tend both to overestimate the research capabilities of individual firms and to assume too optimistically that such research will be undertaken (or, if undertaken, will be effective) at the individual firm level. The Subcommittee is aware of several examples in the pharmaceutical and aircraft industries in which proposals for technically meritorious joint research projects were discouraged by legal counsel because of the uncertain possibility of future antitrust attack. In each such case joint research did not occur, and the reseach was not undertaken at the individual firm level.

Each case presents a tradeoff between the technical advantages of joint research and the long-term desirability of innovation occurring at the individual firm level. Since there can be no easy, all-purpose answer to that tradeoff, decisions must be arrived at on a case-by-case basis, with appropriate weight being given to the encouragement of the rapid development of technology.

If the participants in such programs are prepared to dedicate their outputs to nonparticipants (either without compensation or for reasonable royalties), approval becomes far easier. This is more likely to be the case in research programs aimed at meeting broad social objectives (e.g., environmental objectives)[14] than in those fields in which innovation will have major competitive significance. Where the parties are not prepared to dedicate the research outputs, the enforcement agencies and the courts should give due weight to the commercial objectives which stimulate research in the first place and should afford wide latitude to participants in entering into genuinely ancillary restrictions on future conduct. Given the technical and economic risks inherent in major research, such projects will not be undertaken if the participants in a successful program cannot anticipate reaping rewards commensurate with the risks involved. If antitrust policy will not permit such ancillary restraints (including discretionary licensing and enforcement of patent rights, if any) as would enable the participants realistically to anticipate such rewards, technically meritorious projects will not be undertaken.[15]

3. Issues related to innovation should be given great weight in cases involving the acquisition of small, advanced-technology firms by established firms in similar or related fields. Where the impact of such an acquisition upon the broad-scale implementation of new technology would not be favorable as compared with other realistic alternatives (e.g., expansion of the small firm through venture capital or other financing, aquisition by firms in unrelated fields, etc.), enforcement action is appropriate. However, the enforcement agencies should explicitly recognize (a) the possibility that, in a given case, such an acquisition may hasten the broad-scale implementation of new technology, and (b) the fact that the prospect of acquisition is one of the most important incentives for entrepreneurs in organizing new firms to exploit novel technology. Overly rigid limitations on the options available to small, advanced-technology firms are likely to have an important negative impact upon the development and implementation of new technology.

Discussion.—The relationship of firm size to innovative output has been extensively, if inconclusively, studied.[16] What is clear, however, from virtually every study is that small firms have played an important part in major innovations. It is equally clear that such firms are a fragile lifeform, and require an extremely supportive environment.[17] There is reason to question whether that environment exists today.[18]

Small firms are often founded with a specified innovative idea in mind.[19] Assuming the founders are able to develop their idea to the point of market introduction, and further assuming the idea meets with initial success, several possibilities arise:

(a) The firm may be able to acquire the funds to grow as an independent competitor ("going public", venture capital, borrowed funds, etc.). If capital comes

favorably. Second, it may be that there are in fact few cooperative research projects which have sufficient inherent merit, viewed from the perspective of the participants, to generate any significant demand for review. Third, it may be that the kinds of cases which are brought to the Antitrust Division for review are precisely those cases involving small firms and relatively noncontroversial ventures as to which approval is thought to be most easily given. The Subcommittee has not reached a conclusion on this point. If, however, the Antitrust Division agrees with the Subcommittee's views as to the desirability of encouraging collaborative projects in those cases in which major individual firm efforts are realistically unlikely to occur, then its public pronouncements should make those views clear.

[13] See S. Buchanan, *Economic Aspects of Joint Research and Development Ventures in the Private Sector*, National Bureau of Standards, Experimental Technology Incentives Programs (1976) at p. 14.

[14] Even here, however, there may be some suspicion that the purpose of joint programs is either to take these technical issues out of competition or to retard the rate of technical progress. See *U.S.* v. *Automobile Mfrs. Ass'n*, Civil No. 69–75 JWC (C.D. Cal. 1969), 1969 Trade Cases ¶ 72,907.

[15] The Subcommittee's Recommendations do not specifically address the apparent hostility of the Justice Department to patent rights and patent licensing generally. See, *e.g.*, *U.S.* v. *Westinghouse*, Civil No. 70–852 (N.D. Cal.), BNA Antitrust & Trade Reg. No. 888, p. E–1 (November 8, 1978):

> "What the Government is really proposing is this: Since all monopolies, including patent monopolies, undesirably limit competition, every patent licensing contract should, if at all possible, be viewed as a 'combination in restraint of trade.' Taken to its logical limits, this argument would find almost every patent licensing agreement to be illegal."

No recommendation is made in view of the uncertainty as to the extent to which patent rights and patent licensing are in fact important incentives to innovation (see, *e.g.*, *Technological Innovation and Federal Government Policy*, National Science Foundation (1976) at pp. 26–27). Simply as a matter of logic, however, it would appear that attacks upon patent rights would tend to diminish innovative incentive.

[16] See, *e.g.*, J. C. Hilke and C. B. Goldfarb, *supra; Technological Innovation: Its Environment and Management*, *supra*, at pp. 16–18; S. Buchanan, *Economic Aspects of Joint Research and Development Ventures in the Private Sector*, National Bureau of Standards, Experimental Technology Incentives Program (1976) at pp. 26–34.

[17] In protecting the small firm in its early stages from predatory practices and the market leverage of its established competitors, antitrust policy makes an important and valuable contribution to innovation.

[18] See, *e.g.*, *The Role of New Technical Enterprises in the U.S. Economy*, U.S. Department of Commerce (1976).

[19] J. M. Utterback, *supra*, at p. 625.

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in practice accepted (or disregarded) by foreign firms, or the extent to which any disregard of these principles in fact impacts the position of American competitors in the domestic or international markets.[26] There appears, however, to be a widespread perception on the parts of American business executives that such practices do in fact exist, and that they do in fact afford substantial competitive advantages. If this perception is accurate, it needs to be addressed by American policy; if it is inaccurate, the issue should be put to rest and attention focused on the actual causes of foreign competitive strength.

If such practices exist and are competitively significant, the choices from American policy are far from attractive. One alternative would be to protect the domestic American market from what could be legitimately described as unfair competition. Any such course of action has all the disadvantages which attach to protectionist legislation in general.

A second alternative would be to amend the American antitrust laws to the extent necessary to restore competitive equality. This alternative may tend to enact a "lowest common denominator" approach to international antitrust laws, an outcome which is obviously undesirable; but the policy question, of course, is whether those consequences are *less* desirable than the alternative of requiring American industry to operate at a competitive disadvantage.

A third alternative is to do nothing: to assert, in effect, that America intends to adhere to its antitrust policies with regard to those firms and transactions over which it has jurisdiction, regardless of what the rest of the world may choose to do and regardless of the competitive consequences. If such a decision is to be made, it should be made explicitly and with full knowledge of the consequences: It should not be arrived at through simple inaction.

2. The extent to which foreign competitors engage in joint research activities among themselves should be both (a) a factor in Department of Justice consideration of proposed joint research activities by American firms and (b) a defense in antitrust proceedings arising out of such activities.

Discussion.—There is considerable evidence that joint research activities involving large foreign firms are permitted, or indeed, encouraged by foreign governments. Examples of active encouragement include the Japanese VSLI program, the French "Concerted Action Programs," the West German "big science" and "key technologies" programs, and the British NRDC programs.[27] As noted above (Issue No. 1, Specific recommendation 2), the issue of joint research raises complex policy issues. One element to be considered should be the extent to which joint research in similar fields is permitted to foreign competitors. This is so not only because of the obvious issues of international competition, but also because the selection of such areas for collaboration by foreign firms and governments is relevant to assessing the necessity for joint efforts in those fields.[28]

3. In acquisition cases under section 7 of the Clayton Act, the generally procompetitive short-range domestic effects of permitting large foreign firms with minor American market share to acquire American firms in preference to horizontal acquisitions by American firms, should be weighed against two additional factors: (a) the long-range competitiveness of the surviving American firms in both American and international markets; and (b) the international market position of the foreign acquiror. These factors are particularly critical where the acquired firm has a strong position in new or advanced technology. In such cases short-range domestic market benefits should not be permitted uncritically to override the potential long-range consequences of such acquisitions for the American economy as a whole.

Discussion.—The rate of foreign acquisitions of American firms in technology-based industries appears to have increased dramatically in the past few years, stimulated importantly by changes in currency valuation and the increased relative strength of foreign firms. There are obviously beneficial aspects of such acquisitions, and the Subcommittee does not intend to suggest any restriction based upon the nationality of the acquiror. Conversely, however, the antitrust laws should not give preference to acquisitions by foreign firms; and, at the present time, that is precisely their effect. The focus of section 7 of the Clayton Act is restricted to the domestic market. In those cases in which potential American acquirors have significant current shares of the domestic market, they are precluded from acquiring or merging with other American firms under almost all circumstances. Foreign firms, however—even those of substantially greater size and international market share than their American competitors—may lawfully use an American acquisition to gain an American presence or to enhance a small American position.[29]

To the extent that such acquisitions bring a powerful new competitor to the domestic market, domestic competition is enhanced. However, many—indeed,

[26] A recent analysis, for example, disputes the notion of "Japan, Inc.," while documenting "the Japanese pattern of gaining cost position in sheltered domestic markets . . . before moving to the jugular." J. C. Abegglen and T. M. Hout, *Facing Up to the Trade Gap with Japan,* Boston Consulting Group, Inc. (1978), pp. 3, 24. Several agencies of the Federal Government have, over the years, participated in extensive conferences, studies and reviews of these issues. In general, such efforts appear to reflect a considerable degree of "cultural relativism" and diplomatic tact. It is the committee's view that the recommended study be based on a hard analysis of the actual state of facts (not on the professed norms—without fear of offending our trading partners by a frank assessment of existing practices).

[27] *Government Involvement in the Innovation Process,* Office of Technology Assessment (1978), pp. 43–46.

[28] For example, there are many major Japanese semiconductor firms whose individual technical competence approaches or equals that of comparable American firms. Nonetheless, the Japanese Government has concluded that the scale and complexity of efforts to design and produce the next generation of integrated circuits requires the pooling and coordination of the efforts of these firms, as well as extensive direct government subsidy.

[29] Numerous examples are found in the pharmaceutical and electronics industries. Assets or stock in the following companies, most of which are in technology-oriented fields, have been acquired by large foreign firms in the past few years: Alza (Ciba-Geigy); Miles Laboratories (Bayer); Alcon (Nestle); Litronix (Siemens); American Microsystems (Bosch); Amdahl (Fujitsu); Motorola's television assets (Matsushita); Magnavox (Phillips); and Signetics (Phillips). The list, of course, represents only a small fraction of the acquisitions by foreign firms in this period.

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comment

OF THE PUBLIC INTEREST SUBCOMMITTEE ON INDUSTRY STRUCTURE AND COMPETITION

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industrial innovation

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innovation

Comment of the Public Interest Subcommittee on the Industry Report on Regulation of Industry Structure and Competition

The Industry Subcommittee made several recommendations in two broad areas: environmental, health and safety regulations and antitrust policy. Comments here will be directed only to those recommendations concerned with industry structure and competition. For comments relating to environmental health and safety issues, we refer the reader to the Public Interest Comment on that paper. Much of the same ground is covered. We would just reiterate here that we consider the widely held industry assumption that regulations impede innovation to be a fallacious one.

The view of the Industry Subcommittee seems to be that the current stringency of antitrust enforcement is impeding innovation. They say that "antitrust policy must be recast to accommodate a whole new set of worldwide and domestic realities." They imply that U.S. antitrust enforcement may need to be relaxed when U.S. companies are competing with companies from countries with different types of laws. They recommend that U.S. companies be allowed to engage in joint research when their foreign competitors are allowed to do so. The Industry Subcommittee views antitrust policy as penalizing innovation. They recommend that monopolies gained through the creation of a new technology should be treated differently than those achieved by financial and economic force. And finally, they would encourage that current trend of mergers in which small, innovative companies are taken over by industrial giants.

"BIGNESS" AND INNOVATION

The Public Interest Subcommittee has a very different idea of antitrust and innovation. In the view of our Subcommittee, the current laxity or limitations of antitrust enforcement is impeding innovation. The Public Interest view of the relationship between large, economically dominant corporations and innovation is best described by John M. Blair in his classic book, *Economic Concentration.* In the chapter entitled "The Creative Backwardness of Bigness," he points out that little innovation has come from large corporations:

> Aside from some notable exceptions, particularly in the field of chemicals, the contribution of large corporations to technical progress has fallen far short of what would have been expected in view of their resources, their facilities, and their shares of the market.
>
> * * * * *
>
> The explanation for the poor performance of large corporations is to be found not in any single cause but in the combined effect of a matrix of factors. The relative importance of these causes will vary from company to company and from time to time, but they include the desire to protect the investment in an older technology, indifference to technological advance, underestimation of the demand for new products, neglect of the inventor, misdirection of research, incompatibility between organization and creativity, and the military's built-in resistance to change.

From the radio telephone in 1906, to a 50-year history in the steel industry of "unresponsiveness, if not hostility, to new technologies," to float glass, which was commercialized in England in 1959 even though a 1902 U.S. patent existed on the process, big business in the United States has been singularly *unwilling* to innovate.

The radio telephone, steel and float glass are all examples which took place long before U.S. industry had governmental actions or controls to blame for its failures. The Public Interest Subcommittee would argue against any public policy which is based on the premise that big business is willing and anxious to innovate but is hesitant because of fear of antitrust action. Such a public policy is unwise, because it is based on a premise which has been disproved by long experience.

JOINT VENTURES

In the same vein, the Industry Subcommittee asks that large companies be allowed to form joint ventures for research and development. It must be noted that the Justice Department does allow such corporation in the vast majority of cases in which its ruling has been requested. But what is the evidence of increased innovation resulting from such cooperation?

Secretary of Transportation Brock Adams was recently lamenting the performance of the U.S. auto industry. "In recent years the American automobile industry, I regret to say, has acquired a reputation for

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INDUSTRIAL ADVISORY SUBCOMMITTEE REPORT ON INFORMATION POLICY

industrial innovation

Advisory Committee on Industrial Innovation

The Industrial Advisory Subcommittee on Patent and Information Policy

Report on Information Policy

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- II.—Government Information And The Private Sector

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they need it to advance the state of the art or to solve a problem.

Many studies have shown that inventors, scientists and innovators most often seek out information from friends or fellow workers despite the proliferation of data bases and information collections. Other studies have shown that the flood of information has become so overwhelming that it is becoming impossible to maintain. As a result, many corporate technical information centers are being closed down. Still other studies demonstrate that the most important users of information for innovation either cannot locate the information or, if found, they discover the systems to be too complex or noncongenial and they cannot get at the information to solve their problems.

What is required is better access to information from the user's point of view.

By accessibility we mean information availability, its cost, the time constraints and its convenience. In other words:

- Does the information exist and do the users know it exists?
- Do the users know where it is?
- Can users get their hands on it?
- Can users afford it?
- Will it be available in adequate time to meet user needs?
- Will it be conveniently available?

Perhaps most important, will its value be recognized, and is it responsive to users needs to solve their problems?

I. Information Seeking Activities

The accessibility of information for innovation, which is largely addressed in this report under specific subject categories, may be considered from the point of view of five information seeking functions.

1. Those doing basic research seeking information about other research, and also about applied technologies drawing on basic research;
2. Inventors and those engaged in applied research and development seeking information about basic scientific results and parallel development in applied research.
3. Entrepreneurs seeking information about inventions and technological developments.
4. Entrepreneurs seeking market data on which they can rely for investing in innovative products.
5. Businesses (especially small businesses) and governmental agencies (especially at the local level) seeking information about managerial and procedural innovation—simply new and better ways of doing things.

The method to access is not merely as critical as the need for accessibility. Mechanical means do not always provide relevant information, especially if it is flowing from ongoing original research that has not yet been captured on some medium. Personal contact, symposia, etc., are of vital importance to accessibility, particularly at the leading edge of research and development.

II. Information Policy of Government As It Relates To Innovation

Government collects enormous quantities of information in the process of carrying out its assigned missions. It supports the creation and dissemination of information to further the processes of Government and to promote science, commerce and the social good. Government, through its regulatory processes, also controls the delivery of information. In this respect, Government's role includes:

- Fostering the dissemination of information needed by innovators regardless of its medium;
- Increasing the awareness of information availability to stimulate its application and use;
- Increasing the usefulness of information by addressing needs and quality of information.
- Helping to search out information gaps and foster gap-filling information production and distribution;
- Providing assistance to innovators—especially small businesses—who cannot afford the cost of locating or acquiring relevant information;
- Serving as a catalyst among the various informatoin providers to improve the standards and ease by which information is organized and retrieved, thereby improving the usefulness of information.

In addressing information for innovation and the Government's involvement in information creation and dissemination, the Information Subcommittee was constrained by time in its ability to conduct a comprehensive survey of information that is available to improve both the willingness and the ability to innovate or to assess the gaps in scientific, technical, market, economic or managerial information. The timeframe also precluded the identification and assessment of the full range of the Government's activities in the area. Thus, it may be that the Subcommittee may be offering recommendations which are already under consideration or, perhaps, even being implemented.

III. Task Of The Subcommittee

What were the principal guidelines under which the Subcommittee has conducted its study?

1. The availability and use of information were viewed solely as they impact innovation and the Government's role was addressed only where it was believed that Government can eliminate barriers to, or stimulate availability and use of, information for innovation.

The Subcommittee was quite cognizant of information shortcomings in many areas of the American economy and aspects of its citizen's personal, political

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in the Government or in the private sector which provides exactly the information required.

There are many examples from both large and small corporations. In a study conducted for one of the top 50 corporations in the United States, it was discovered that the scientists working on product and process developments had little knowledge of outside scientific and technical information resources with the exception of those journals to which they subscribed. Indeed, they had little knowledge of information existing in corporate libraries outside their own laboratories. A survey of other leading corporations confirmed similar problems throughout industry. One successful solution was to establish a phone-in locator service that directed a scientists or technician to the appropriate information source. A union catalogue for the scientist did not work because he rarely took the time to seek it out and use it and it could not be made available at all R. & D. locations.

One oral report to the Committee by the Chief Economist of the Small Business Association discussed the same dilemma for small businesses. Individually, these small businesses cannot afford to set up similar locator services no matter how modest the cost.

Many scientists and technologists have reported that they use an informal, personal network to uncover information sources or solutions. For those in the mainstream of a discipline or technology, this is understandable and possible. For those who are not yet members of the "invisible college," or where, increasingly, it is necessary to get information from other disciplines, this is a serious handicap. Thus, it is equally important to make available information about the individuals who are knowledgable in given fields as well as to report the nature and scope of ongoing (as yet unpublished) research and development.

III. Problem-Oriented Data Bases

The information explosion made it practically impossible for any individual to keep abreast of all the literature and data being disseminated in any one field. Abstract journals and bibliographic data bases were developed in profusion—many of them funded by the Federal Government—to enable one to keep in touch with developments and outpourings in specific fields. These data bases basically are retrospective finding tools; they help seek out information sources, but they are not themselves capable of providing solutions or even helping to define problems.

While such retrospective tools are valuable, further efforts to expand them would be an ineffective diversion of Government's resources. What is needed is a rethinking of the *content* requirements of data bases, and improved techniques for "massaging" and retrieving them.

To create data bases that are problem oriented, it is necessary that the probable answer be embodied in the data base itself; that the search system (terms, etc.) be related to and derived from the contents of the data base; that the system be capable of dealing with concepts and associations and not merely with nouns; and, finally, that there is feedback (as discussed in the next section) and positive reassurances that the information is being "used" properly.

While there are some "state of the data base art" difficulties in implementing the creation of such data bases, economic constraints are perhaps more significant.

Two principal cost elements—namely, input and storage—impact the general application of problem-oriented data bases. Inputting is people dependent and, therefore, expensive. Although in some instances input costs can be kept down, as when the machine readable tape is derived as a byproduct of computerized typesetting, the source of the data restricts the scope and availability of the data base content to some primary product which may be unrelated to the purposes of the data base.

Storage costs also continue high despite significant technological breakthroughs such as bubble memory. The magnetic storage capability made possible by bubble memory or chips has not yet been applied to secondary storage which is still commonly handled by disks and tapes with limited margin for further compression.

Finally, the access protocols are still not user congenial, which sharply limits willingness to make extensive use of online systems. Users must often turn to information scientists (intermediaries), who are familiar with the protocols when they wish to search a data base and so the resource is used infrequently or is ignored completely.

Research to solve many of the obstacles to the expansion and availability of problem oriented data bases is underway in both the public and private sectors and should be supported.

IV. User Feedback

Since one of the goals of information transfer is user orientation, data bases should have a built-in mechanism for user feedback to draw on user experience in order to enrich the data base; to correct it and, in general, to make it more applicable.

Unfortunately, too many systems fail to provide for user interaction with the data—the flow is only one way. Thus, as a result, additional data needs are not known, the value of the data cannot be tested, and the search terms or parameters cannot be sharpened or expanded.

In another context, user feedback can help in explaining the uses to which the data have been put, and in this way, perhaps bring about serendipitous innovation.

In the Subcommittee's discussion of patent information issues, a specific suggested application of the user feedback principle is recommended. In other data bases, it should be possible to store and monitor user inquiries (problems); or to add directories to specific information on a subject when they are not embraced by the data base; or even to get requests on the frequency and time lost when systems crash or the data base itself is nonresponsive.

Government should consider these important refinements to its own data bases to make them more useful.

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Government should consider these important refinements to its own data bases to make them more useful.

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ing the growth of problem-oriented data bases and the related issues of protocols, standards and user feedback.

A locator service should be established which would provide information as to the existence and content of data bases as well as information on people resources and ongoing research and development in specific fields.

The Government should encourage establishment and development of combined electronic information and communications systems by the private sector, including small businesses. It should resolve as quickly as possible the confusion in this increasingly important area through adequate legislation. In addition, the Common Carrier Bureau within the Federal Communications Commission should be more sensitive to technological development and should update its regulations more regularly.

PATENTS AS A SOURCE OF INFORMATION

Introduction

The patent system in this country serves two broad purposes. First, it spurs invention by protecting the intellectual property right of the inventor who has hopes of economic rewards; and second, it requires disclosure of inventions and so diffuses the state of the "useful" arts.

The patent document serves both as a legal document and as a source of technical information meeting several needs:

- It is a reference source for researchers and writers to find new ideas and to gain general knowledge of technologies;
- It is a reference source for use by an inventor and his attorney) to prepare a patent application;
- It is a reference source of prior art used by the Patent Office examiners and prospective innovators.
- It is an accurate description of the content and scope of the invention.

Looked at this way the patent system as it now functions should spur innovation because (a) it provides information to help evaluate a technology or locate an inventor who can furnish a license for the application of that technology; (b) it reveals inventions to prospective innovators and thus can save many man-hours that could be wasted recreating the same technology; and (c) it provides building blocks for the development of new products or processes.

In addition to whatever use inventors make of the patent system, the patent document can stimulate financing of innovation by giving the entrepreneur a sense of security about the invention he is funding and hence, a sense of confidence about his potential profit. This suggests that the patent document as an information resource is potentially most useful in affecting the *willingness* to innovate rather than the *ability* to innovate. At present, it would appear that the patent document is suitable to lawyers and technical and scientific personnel for their purposes; however, it is not geared to provide information to the innovator (or his financial executive) to enhance their *willingness* to innovate.

The principal issues involving availability and use of patent information and its implications for the innovative process fall into three groupings:

- The accessibility of the information that already exists in the patent document,
- The relevance of the information in patent documents to innovation,
- Dissemination and use of patent information.

It is important to note that the patent system includes only a portion of the invention that might give rise to innovation. An increasing number of important developments are omitted, either because they are not patentable or because the inventor chooses not to disclose. (See report of the Patent Subcommittee for further discussions.) Thus, the system does not cover trade secrets, systems innovations, marketing innovations, or innovations in management organization and implementation, all of which could have important implications for the innovative process. The issues addressed in this section of the report relate only to that information which flows from the patent document itself.

I. The Accessibility of Information in the Patent Document

The issue of accessibility can be viewed from the perspective of the Patent Office itself and from the perspective of the user of patent information.

The concensus of the Subcommittee is that the greatest impact of patent information is in the ability of the inventor to file a good application and in the PTO's ability to provide a thorough examination and issue valid patents. Aside from any legal problems inherent in the patent system (which are addressed by the Patent Subcommittee), the assurance of good patents require a more complete examination so that patents can issue with a higher level of confidence of validity. It has been stated elsewhere that the most serious defects of the patent system result in uncertainty about the reliability of patents and that such uncertainty deters investment of the money required to commercialize an invention. By improving the search, this uncertainty can be reduced for both the PTO and the inventor.

It is clear that some method of automated searching is required. The method should be designed to serve the needs of the PTO and the inventor as its first objective. Information from the system should be readily available to the potential inventor and researcher, but the primary function of the search system should be to allow for good patents to issue. The PTO and others have offered several proposals for improvement. A number of the proposals have valuable features and with the proper choices, a comprehensive system with flexibility can be devised.

In addition to whatever use inventors make of the patent system, the patent document can stimulate financing of innovation by giving the entrepreneur a sense of security about the invention he is funding and hence, a sense of confidence about his potential profit. This suggests that the patent document as an information resource is potentially most useful in affecting the *willingness* to innovate rather than the *ability* to innovate. At present, it would appear that the patent document is suitable to lawyers and technical and

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tion (or cover) page which would not be part of the legal document but which would provide easier accessing of the patent and more information concerning its use and potential application.

III. Improving Awareness And Use Of Patent Literature

The innovation process can be stimulated through greater awareness of the availability and value of patent information. To date, the Patent Office maintains a number of depository libraries, although only one of them has a fully classified system. The others maintain the collection by number only.

It is important for the full range of patent information to be available in regional locations and the Patent Office should be encouraged to improve its depository system. Furthermore, development by the Patent Office of an improved classification and computerized search and retrieval system would make possible the on-line searching at remote locations of the entire document file.

The Patent Office should encourage private firms to provide patent services to specific technologies.[4] However, a prerequisite is that the Patent Office establish a policy concerning Government's role in patent information dissemination. Potential services which would usefully apply the patent information are likely not being developed without the assurance that the Patent Office will not itself provide competitive services. With a clearly defined policy, the Patent Office can encourage the establishment of information systems or centers and perhaps provide grants or subsidies to get them started.

The Patent Office should also consider undertaking programs to inform people of the availability of patent information and educate them in the use of its system once it is installed. Additionally, since the cost of searching and filing for a patent may be beyond the financial capabilities of individuals or smaller companies, the Patent Office, may want to consider subsidies to help individuals and smaller companies pay for services that are available.

RECOMMENDATIONS

The Patent Office should strengthen its depository system and should plan to install its automated search system in key locations around the country when completed.

The Patent Office should encourage creation of new private sector systems.

The Patent Office should consider providing education, technical and financial assistance, particularly to individuals and small businesses to use the system effectively.

FOREIGN MARKET AND TECHNICAL INFORMATION

Introduction

As noted in the final section of this report, the Federal Government creates, collects and in many ways makes available enormous amounts of information potentially useful to American industry in achieving innovations in both production and marketing. In this section we will address the availability and applicability of:

- Information related to foreign markets and technology necessary to promote world trade by U.S. firms, particularly, smaller business seeking foreign-market entry;
- Information related to the stimulation of product innovation with access to and utilization of new technology;
- Information that can help business cope with the uncertainties of the foreign marketplace.

The two primary objectives, export markets and the opportunity to acquire new technology and stimulate product innovation, are intertwined. They are relevant to an era charterized by rapid technological change and increasingly integrated world markets. They can help counter the trend of the declining position of U.S. industry vis-a-vis other industrial nations in creating new and better products for world markets. However, the information relating to foreign markets that is available (conventional marketing information such as market size and competition, as well as other information about the marketplace, such as preferences, practices and regulations) does not benefit smaller American businesses as it should to bring them into the mainstream of world trade. Additionally, the accessibility of foreign technical information to all segments of American industry needs to be improved, especially as the amount and relevance of such information to the innovative process from abroad grows in relation to such information generated domestically.

A program of policy options for government action are suggested to:

1. Improve the availability and timeliness of foreign marketing information, including requirements necessary to meet foreign governmental regulations and standards most relevant to companies seeking market entry,

2. Expand and rationalize the collection and distribution of foreign technical information,

3. Limit restrictions to and encourage international transfer of information as to technology and markets.

I. Improve Availability Of Foreign Marketing Information

The revelance of market information to the innovative process has been clearly demonstrated. Studies have indicated that 60 to 80 percent of important innovations in a large number of fields have been responsive to market demands and needs.[5] Furthermore, other studies have shown that of innovations that have failed, over 50 percent failed because of marketing and

[4] An example is the system which has been developed for photographic patents by that industry and is now being run by Rochester Institute of Technology.

[5] James M. Utterback, "Innovation in Industry and the Diffusion of Technology," Science, 15 Feb., 1974.

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FOREIGN MARKET AND TECHNICAL INFORMATION

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primary business objective. The majority of technical advances can be expected to come from outside the United States in the future because as much as two-thirds of all R. & D. is now conducted by foreign laboratories. In addition to the direct benefit of the knowledge of the technology developed outside the United States to the innovative process, the information about such technology can serve indirectly as an indicator of the technological threat of the products of foreign competitors as well as the thrust of potential products and services to be derived from the resulting technology.

The Office of Technology Assessment and Forecast of the Patent and Trademark Office[9] provides information relating to areas of high technological activity in foreign countries and NTIS disseminates information on foreign patents. However, these systems are not interelated, nor is the collection process completely rational or readily available. In addition, foreign scientific and technical information should be made more available and accessible through systematic collection and distribution of foreign patent information.

A recent incident clearly illustrates a number of key points about the flow, use, and importance of timely information about foreign patents and implications for innovation.

> Casual reading of an airline in-flight magazine on an infrequent trip to Europe resulted in an inquiry about a foreign patent in a minor country. The patent had been issued 9 months before this incident. The U.S. patent had been applied for but not issued. The R. & D. manager circulated the article to his people who made contact with the references cited and the parties met 3 months later. The contact made by this group was the first of hundreds of other contacts by other parties. On the day of the visit a meeting was being held to agree on a multimillion dollar expenditure for a new process/product which could be obsoleted by this new invention. Within the formalized information system in this company, it is estimated that information on this invention woud have become known 12 to 14 months after the day of foreign patent issuance. It is also estimated that the information might have surfaced in 16 to 18 months by private information system companies and services.
>
> This information led to brain-storming sessions to hypothesize why the product worked and how the same principals might be applied to other products. A number of alternatives were studied and found to have merit. It also led to possible applications in fields other than the direct product use cited.

At the same time the U.S. Government should seek out technical reports of foreign government-sponsored R. & D. activities. At the present time, the U.S. Government (Department of Defense) follows a procurement policy which requires acquisition from its contractors of unlimited rights to certain technical data and limited rights to other (proprietary) technical data. However, our allied governments (except possibly Germany) do not normally require such rights from their contractors. Thus, when the U.S. Government enters into a memorandum of understanding regarding the transfer of technological information with any such ally, it must transfer the data to which it has unlimited rights and in some cases the data to which it has limited rights. However, the allied government has no technological information to transfer to the U.S. Government. This problem has been accentuated recently by the U.S. Government commitment to cooperate with our European allies in developments and procurements for NATO.

[9] "Donald W. Banner, Patent and Trademark Office, Agency Paper for the Domestic Policy Review of Industrial Innovation, Memo for: Jordan J. Baruch, Oct. 13, 1978, p. 10.

RECOMMENDATIONS

Government should evaluate the program of the Office of Technology Assessment and Forecast of the Patent and Trademark Office for providing information relating to areas of high technology in foreign countries. If that program is found to be deficient, it should be improved; if efficient, it should be more widely publicized.

Government should encourage the development of the systematic collection and distribution of foreign patents similar to the Soviet Union's Central Patent Information Engineering & Research Institute (TSNIIPI) or, at the least, include complete foreign patent information in the U.S. PTO system. (Refer to attachment C.)

Government should negotiate with foreign countries the exchange of technical reports of government-sponsored R. & D. activities and collect and disseminate information about such foreign reports (abstracts as a minimum) much like NTIS now does for U.S. Government-sponsored technical reports.

III. Encourage International Transfer Of Information

In recognition of the far greater willingness of the U.S. Government than other national governments to make basic information available, and the degree to which foreign competitors use it to their advantage in U.S. markets, the U.S. Government should arrange for increased foreign information to be made available domestically. This could be among the conditions for the United States to enter into trade and other agreements.

Specifically, there is the quid pro quo associated with international technology transfer. Encouraging technology transfer serves two purposes: (1) the U.S. firms are now more often the recipient of technology than the supplier and will become increasingly so as more technological advances come from outside the United States; and (2), there will be increased incentives to innovate because of greater opportunity to receive a reasonable return from the broadened international market.

However, on the one hand, many foreign countries require governmental approval of technology transfer agreements. These usually involve lengthy negotiations with the governmental agency involved as well as with the other party to the technology transfer. This discourages technology transfer in general, and often

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ATTACHMENT A

Interoffice Memo
DATAPOINT CORPORATION
November 22, 1978

TO: H. E. O'Kelley
J. O'Brien

I would like to relate the following excerpt from a trip report on a recent trip we made with TRW to the British Post Office related to selling our Infoswitch/Automatic Call Distributor (ACD) in the United Kingdom.

> There appears to be a significant obstacle in attaining British Post Office approval to market and install ACD systems in the United Kingdom. The BPO considers that an ACD is a switching machine (which it is) and therefore the BPO must, by English law, certify the reliable performance of the product and they must maintain at least the switching subsystem portion and the instrument portion of the ACD with their own maintenance force. All of the PBX suppliers that we talked with indicated that the BPO approval process could be expected to take from 18 months to 3 years, and that we should be prepared to make dramatic architectural changes in the product at the demand of the BPO. Plessey has had to do this with the ROLM CBX, GEC is currently doing this with the SL–1 PBX, and ITT has designed from scratch a PBX which was anticipated to meet the BPO spec from the beginning; however, it is still taking them several years to complete the approval process.
>
> In meeting with the personnel from the Post Office who would be responsible for the ACD approval, we found the following:
>
> 1. The Post Office requires U.K. company sponsorship. The Post Office steadfastly refused to tell us or provide us with the specifications that the ACD must meet. Their approach is that they have supplied this information to the U.K.-approved suppliers and that we must work through one of these suppliers.
> 2. There is no specific Post Office regulation for ACD systems. Therefore, the Post Office anticipates testing ACD as if it were a PBX.
> 3. The PBX specification includes regulations on transmission, exchange circuit interfaces, electrical safety, components, and software. They also have stringent requirements on the format and content of documentation and training material.
> 4. The BPO would require a demonstration system installed and maintained by the vendor for evaluation. After an initial evaluation, the Post Office would allow three trial customer sites. During the time the Post Office would maintain these systems and gather performance data on the reliability and compatibility of the product.
> 5. The maintenance philosophy of the Post Office is to minimize the number of failures in their maintained systems. To accomplish this they require fail-safe "security" in the form of duplexed common control processors in stored program switching systems. Since the ROLM and the SL–1 PBX's have been forced to be modified to provide duplex processors, I expect that we also would be required to modify our product in this manner.
> 6. The BPO has required Plessey and GEC to change plastic DIP integrated circuit components to ceramic components. It appeared negotiable (but still uncertain) whether or not the ACD would have to be manufactured with only ceramic IC's.
> 7. The customer is not allowed access to the switching equipment. BPO requires that this equipment be located in a locked room and be accessed only by Post Office Maintenance personnel. This means that our manually activated bypass switches must be replaced with remotely controlled relays.

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the "Central Patent and Information Engineering and Research Institute" (TSNIIPI) which was headed by Dr. Potislav P. Vcherashny. A major function of this organization was to obtain technical information and distribute it to those in the Soviet Union who would have use for this information.

Specifically, I was shown what they do with the U.S. Patent and Trademark Office Official Gazette which, as you know, is published every Tuesday and includes drawings and a Claim of each U.S. patent issued. The Soviet's publish their own version of the U.S. Official Gazette with each page being divided into four rectangle sections with the pages being bound on the shorter side rather than the longer side. Each rectangle section includes the drawings and claims from the U.S. Official Gazette. On the back side of the page, behind the English language version, is a Russian language version of the claim. The rectangular portions of the pages can be cut out and put in a card file and apparently, they are used in a significant manner by a number of Soviet enterprises. There are more copies of this bilingual version of the U.S. Official Gazette printed and distributed in the Soviet Union than the U.S. Patent and Trademark Office prints and distributes in this country.

Apparently, this is also done for other significant countries, including Japan, W. Germany, Gr. Britain, France, and others.

If a technical person wishes further information about one of these inventions, a translation of the patent can be obtained from TSNIIPI. TSNIIPI operates primarily as an information gathering and disseminating organization employing about 1,000 people and maintains an extensive telex network to transmit information on foreign patents and other pertinent literature. A number of computers are used in this function.

While I realize there are some private organizations (such as Derwent) which do provide some useful services in patent abstracts, it is suggested that a centralized organization for collecting, distributing and translating the technical information included in foreign patents could be a useful function to provide an improved technical base upon which to innovate.

/s/Homer O. Blair
Vice President
Patents and Licensing

ATTACHMENT D

IMPORT/EXPORT REGULATION

This matter involves a proposed countervailing duty by the U.S. Treasury Department under 19 U.S.C. 1303. A countervailing duty is imposed by the Treasury Department as an additional duty on the import of any product which benefits from any type of "bounty or grant" (subsidy) from a foreign government to the foreign producer of the imported product.

In this case, a Canadian subsidiary of a U.S. company received a grant from the Canadian Government in the amount of about $361,000 to finance 50 percent of the research and development cost of a product which is used by petroleum companies to detect and prevent spillage during the process of filling petroleum-hauling trucks. The product was wholly developed and produced in Canada and is imported for resale in the United States. The product is also sold in Canada and in several other foreign countries.

This case appears to be the first instance where Treasury has assessed a countervailing duty against R. & D. grant money. Previously, countervailing duties have been imposed on grants made on other activities in the manufacture, production or export of the product. We believe that imposing a countervailing duty on R. & D. subsidies is beyond the scope of the law, as those activities are simply too far "upstream" economically from the acts of manufacture, production or export.

If the duty should issue, it would probably be in the amount of about 10 percent and would create a significant competitive disadvantage for the U.S. company in the marketplace.

The significance of the issuance of such a countervailing duty here would be that American companies would be discouraged from having their foreign subsidiaries do any R. & D. work which is partially funded by the government of the foreign host country.

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REGULATORY IMPEDIMENTS

INTRODUCTION

Other Subcommittees are addressing the issue of Government regulation and standards as they affect the ability to innovate. In this section, the Information Subcommittee concentrated on areas of government regulation that affect the movement of information and, thereby, impact innovation through the absence of adequate or timely information.

Excluded from this section are (1) those regulatory activities of Government that affect the flow of information across national borders, which are discussed in the Foreign Market and Technical Information section of this report; and (2) the regulation of communications media which impact the flow of information, particularly with the increasing use of computer to computer communication, which is discussed in the Meeting User Needs section of this report.

Two specific issues require government interest and concern: first, the rights-to-data which result from government contracts; and, second, the impact of the Freedom of Information Act on the willingness of companies to engage in R. & D. efforts or to disclose proprietary information to the Government.

I. Rights-to-Data

With respect to technical and business information developed under government contract, or otherwise through the use of government funds, the long-standing government policy concerning what information must be delivered to the Government and what rights the Government acquires in such information, affects the contractor's desire to innovate. If all information developed under the contract is required to be thoroughly documented, and such data delivered with unlimited rights to the Government, then there is little incentive (i.e., "competitive edge" in the market) left to the contractor. Alternatively, if some of this information can be delivered to the Government on a restricted basis so that it is not freely available to parties outside the Government, it would assure the contractor some lead time and encourage commercialization.

The present data rights policy in U.S. Government procurement of research and development arose after World War II at a time when the U.S. technological lead over the rest of the world was dominant and there was no adverse balance of payments problem for the United States. Consequently, a policy was adopted and is currently adhered to, that protects only carefully defined trade secrets of contractors and private business and, of course, classified matter for security purposes. All other technological information is published free to the world.

Furthermore, the protection of proprietary and trade secret technological information delivered to the U.S. Government has eroded because of the manner in which the Freedom of Information Act has been implemented, albeit contrary to the intent of Congress (refer to next section). The end result is that all technological information which the U.S. Government acquires with the right to publish, as well as some information which the U.S. Government acquires without the right to publish, is available for the free use of all.

At the present time many European countries are prospering by adding their own development to the technological information base supplied by the United States. However, it is the practice of those countries to allow the private contractors to retain rights to the technological information developed. Thus, European government-sponsored technological information is not published and made available to the United States, even though United States sponsored technological information continues to be easily available to the world.

In addition, the new European Patent Convention has adopted the "Absolute Novelty" rule under which technical reports to governments in "free societies" are considered public knowledge. Thus, such reports delivered to the government without restraints and without security classification are barred from patent protection as of the time of delivery.

The combination of "Absolute Novelty" rule and the U.S. Government policy of publication of technological information makes acquisition of valid foreign patents based on U.S. Government-sponsored technology very difficult, if not impossible. In the other direction, because foreign government-sponsored technological information is not published or released to the public, it remains the property of the developing contractor. Therefore, there is no bar to patentability and foreign countries may file U.S. patent applications without risk of a publication and secure both U.S. and foreign patent rights.

RECOMMENDATION

The Government should revise its Rights-to-Data Policy so as to afford contractors the protection that will encourage innovation (commercialization) and ensure U.S. firms an equal footing with their foreign competitors. Specifically, an equitable balance must be established between the requirements of the U.S. Government and the rights retained by contractors to the technological information developed by them.

II. The Freedom Of Information Act

With the enactment in 1966 of the Freedom of Information Act, many previously secret activities and operations of Federal agencies were opened to public scrutiny. Under subsequent amendments to FOIA, additional types of information to be released by the Government were enumerated and certain types of information were exempt from FOIA coverage. Included in the exempt category were "trade secrets and commercial and financial information obtained from a person and privileged or confidential."

However, because requests for information under the act have been interpreted by individual agencies and departmental directives and there has been no consistent government policy, there is no assurance that a specific piece of information or technology delivered to the Government and identified as a trade secret or in some

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In 1973, Duquesne went to the Board of Appeals, where the case was also lost.

Duquesne then took the issue to the Court of Custom and Patent Appeals, which ruled in Duquesne's favor—that is, that the patent should be issued.

The Patent Office then filed a suit, *Dann* vs. *Chatfield,* which the Supreme Court refused to hear. The result was that the CCPA ruling was to stand.

In spite of this, the Patent Office has refused to issue Duquesne's patent for "Regulator." It has been more than a year since the Supreme Court decision.

This action by the Patent Office has prohibited Duquesne from effecting license agreements with a number of potential "Regulator" licensors—including IBM. This, in turn, has prevented widespread use of the technology inherent in the "Regulator" system. Because of the nature of the "Regulator" software, source code must be supplied in most instances if the user is to optimally utilize the system. But other software protection mechanisms do not sufficiently protect such arrangements, so consequently Duquesne refuses to initiate the license agreements. The company has stated that it will maintain this posture until the patent is issued.

RECOMMENDATIONS

The CONTU recommendations for the protection of software and data bases should be implemented.

The Patent Office should reinstitute guidelines (first drawn up in 1966 and later withdrawn) that specifically establish parameters for software patentability and issue patents for those programs which meet the requirements.

GOVERNMENT AS A CREATOR AND DISTRIBUTOR OF INFORMATION

Introduction

The Federal Government in fulfilling its mission creates, funds the creation of, and collects enormous bodies of information potentially useful to American industry in achieving innovations in both production and marketing. These include (in addition to information on patent applications treated in other sections of this report) technical information and research reports accumulated in the work of such agencies as the Department of Defense, Department of Energy, NASA, and the Bureau of Standards; reports of research commissioned or funded by Federal agencies; census reports; bibliographic data assembled by such agencies as the Library of Congress and the National Library of Medicine; and reports of commercial and scientific attaches stationed abroad.

The basic difficulty has been to see that this information promptly reaches those specific points in the private sector (and where relevant, those points in State and local governments) at which it can be effectively used to introduce innovative products or processes or to penetrate new markets. The basic problem, in turn, involves three fundamental issues or groups of issues:

A. The Government's making relevant information promptly and effectively available for dissemination;

B. The impact of governmental information policies on private sector activities in the dissemination of information from government sources;

C. Action by the Government when necessary to provide incentives to fill information gaps.

I. The Government's Willingness To Make Information Available

The U.S. Government has a relatively open policy about information—probably more open than that of any other national government. The Freedom of Information Act provides legal sanctions for such a policy. Generally speaking, information created or collected by the Government is availbale unless limited by considerations of national security, as in the case of much atomic and defense research, or of individual and corporate privacy, as in the case of tax returns, raw census data, and other information required to be filed with the Government.

The Government itself acts to make information widely available. As examples: The Public Printer through the Superintendent of Documents; NTIS through its efforts both to catalog and to offer a copying service on unpublished government and government-funded research reports; the Bureau of the Census by making copies of its basic tapes available for analyses by others; The Library of Congress through its MARC tapes; and the National Library of Medicine through MEDLAR and MEDLINE which make extensive bibliographical services available.

However, the problem is most often not the availability of the information, but rather the timing of its distribution, the difficulty of access or the cost. Moreover, it is impossible for the Government to identify all the potential users or applications of specific data resources, the precise forms in which they may be made useful, or their relationships with other information resources. To have information relevant to innovation more widely disseminated, requires an even greater willingness on the part of Government to open its information files for active exploitation and adaptation to the needs of the users.

Two examples of Government's reluctance:

(1) The unpublished reports of the Congressional Research Service and that Service's on-line system providing abstracts, summaries of issues, and status of pending legislation are reserved to the use of Congressional Members and staff (and to citizens only through their Congressmen) though, with the exception of a few unpublished reports, nothing in them requires confidentiality.

(2) The reports of commercial attaches filed with the Commerce Department have an abundance of information about economic conditions and market opportunities abroad that would be useful to American firms seeking new export opportunities. Their bulk and diffusiveness, lack of indexing, and limited printing make them an essentially unusable resource to most American business. They might, however, well be the raw material for newsletters or an on-line accessible data base that could connect specific items of information with the specific classes of firms that could use them.

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From the foregoing discussion, it is evident that what is needed is the *flexible* and *imaginative collaboration* of governmental agencies and private enterprises in the solution of information dissemination problems, rather than one of competition or even hostility.

RECOMMENDATION

A more productive Government-industry relationship should be established by policy directive (see attachment F) whereby the Government will refrain from entering into competition with existing services without a clear demonstration of public need and will work with the private sector to help fill information gaps.

Government should encourage the wider dissemination of innovation related information from Government resources and assist in filling the needs for innovation related data.

ATTACHMENT F

It was the consensus of the Subcommittee that the issuance of an OMB directive along the following lines would be the most effective means of creating a more productive Government-industry relationship:

> It is the policy of the Federal Government to cooperate with the private information industry to achieve the most effective dissemination of scientific, technical, economic, and marketing information that will help American industry, agriculture, and labor achieve innovations that will increase productive efficiency and open new markets.
>
> Federal agencies receiving or creating information of a nonconfidential nature potentially useful for innovation in the American economy will make it readily available for dissemination. This will include making copies of documents, indexes, tapes, discs, or other media in which the information is embodied available in usable form on a nonexclusive basis and at no more than the incremental cost of reproduction to information companies prepared to add value to the material by such means as indexing, abstracting, reformatting, arranging, combining, analyzing, and packaging and to undertake its commercial dissemination to those industries, firms, and individuals who may find it useful in the achievement of productive and marketing innovation.
>
> Federal agencies will not compete in the dissemination of information with ongoing private enterprises adequately serving the public need, nor will they enter into new services of this sort until it has been determined after public inquiry that no private enterprise is both willing to undertake to provide the service and able to do so.
>
> The Assistant Secretary of Commerce for Science and Technology will be responsible for coordinating and overseeing compliance with this directive.

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comment

OF THE PUBLIC INTEREST SUBCOMMITTEE ON INFORMATION POLICY

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industrial innovation

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innovation

Comment of the Public Interest Subcommittee on the Industry Report on Information Policy

The Industry Subcommittee has recommended government action in several aspects of information generation and dissemination. It advocated the development of an effective computer-based search and retrieval system for patents coupled with various schemes to make patents more accessible and understandable. It advocated extensive data collection and dissemination of information on requirements for marketing in foreign countries. It advocated making all nonconfidential classified government data available at incremental costs, but also asked that Government refrain from entering into competition with existing commercial services without a clear demonstration of public need.

Unsubstantiated Problem

The issue of a clear demonstration of a public need is a good place to begin the entire discussion of an additional or improved role for Government in information policy as it relates to innovation. To put it bluntly, is there a need for all of this? Of course it is possible to design and implement better information systems. But who would benefit? Would it promote innovation? What types of innovations would be promoted? Would it be efficient for its cost? We see conflicting evidence on all of these points.

One of the continuing concerns of the Public Interest Subcommittee was the problem of the lack of data to substantiate calls for new policy. At one time we considered calling our committee the Chicken Little Committee, because we wondered if we were being asked to discuss the problem of the sky falling with no evidence that it was. This seems to be particularly the case with regard to information policy. Where is the data that shows that the lack of a better organized, more accessible patent data base is impeding innovation? Where is the evidence that there even is a lack of information about foreign markets, or that if the lack does exist that it is impeding innovation? We must remain skeptical. Information specialists naturally want to design all-encompassing information systems, but demonstration of the need should be a prior concern of public policy.

Rights-to-Data

The Industry Subcommittee urges Government not to release information developed by a particular industry in the course of fulfilling a government contract before that industry has the competitive edge which holding back such information might offer.

If a government contract has been let, it is presumably in fulfillment of some mission of Government. The Government's money—which is to say the people's money—would have subsidized the development of an idea or product, supposedly because a representative of the people, a government agency, determined it was in the public interest to do so.

If the company concerned was not willing to make public the fruits of its research, perhaps it should not have accepted a government contract or subsidy. Perhaps it should have financed the research or development with corporate funds. The government has many roles, but the Public Interest Subcommittee does not see one of them as providing an additional incentive for private industry to pursue the profit incentive. The Public Interest Subcommittee would make a clear distinction between innovation taking place within and paid for by the private business sector, and innovation paid for or subsidized by the Government. As we have said repeatedly, the latter must conform to congressionally mandated goals. Government sponsored innovation should not be withheld from the public, nor should the public have to pay a premium to a monopolist to enjoy the benefits of that innovation.

Freedom of Information

The Industry Subcommittee recommends that the Freedom of Information Act be amended to make clear that information which is classified and described in subsection 552(b)4 should not be released under the act. They explain that while the Freedom of Information Act has already been amended so it exempts trade secrets and commercial or financial information obtained from a person and privileged or confidential information, that the government agency interpretation has been such that the intended protection of privately developed and trade secret technological information delivered to the U.S. Government has eroded.

Industry goes on to explain that this state of bureaucratic bungling has a deleterious effect of dampening the desires of firms to generate information and/or invest the necessary resources to develop the information in a commercial setting.

This is an issue which has been raised in several of the Industry Subcommittees, but it has been accompanied by a singular lack of documentation. The Public Interest Subcommittee would like to see a company by company, Federal agency by Federal agency "horror story" list, a specific documentation of instances where

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INDUSTRIAL ADVISORY SUBCOMMITTEE REPORT ON PATENT POLICY

industrial innovation

innovation

Advisory Committee on Industrial Innovation

THE INDUSTRIAL ADVISORY SUBCOMMITTEE ON PATENT AND INFORMATION POLICY

REPORT ON PATENT POLICY

A Draft Report of the Industrial Advisory Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovation established as part of the Domestic Policy Review.

February 6, 1979

Notice: This report represents the views of the Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovation, an advisory committee convened by and reporting to the Secretary of Commerce. The views of the Subcommittee do not necessarily represent those of the Department of Commerce or any other agency of the Federal Government.

FOREWORD

A domestic policy review of industrial innovation is being conducted as a result of President Carter's concern for the status of industrial innovation in the United States. This review is being directed by the Industrial Innovation Coordinating Committee, chaired by Secretary of Commerce Juanita M. Kreps.

An Advisory Committee on Industrial Innovation has been established that will bring to bear the views of business and industry, organized labor, the public interest and the academic community expert on the subject. The subcommittees created under this Advisory Committee are examining a wide array of federal programs and policies that impact upon industrial innovation.

This Draft Report on Patent Policy was prepared by the Advisory Subcommittee on Patent and Information Policy under co-Chairman-Information Policy Herbert R. Brinberg, President, Aspen Systems Corporation, and co-Chairman-Patent Policy Robert B. Benson, Director, Patent Law Department, Allis-Chalmers Corporation. The subcommittee, composed of representatives of the business and industrial community, has focused on economic and trade issues and their impact on industrial innovation.

The public portion of the domestic policy review will culminate in a series of seven public symposia to be held in January, 1979. This report, together with those of the other advisory subcommittees, will form the basis for presentations and discussions at the symposia. The moderator for these symposia will be Dr. Jordan J. Baruch, Assistant Secretary of Commerce for Science and Technology.

Following is the membership of the Subcommittee on Patent and Information Policy, as well as the symposia schedule.

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The subcommittee also recommends clarifying the statutory standard of patentability and permitting licensees to agree not to attack the validity of licensed patents.

An adequate extension of the patent term should be provided when commercialization of patented inventions is delayed due to Federal regulations.

The Subcommittee recommends establishment of foreign policy which encourages other countries to provide United States innovators the right to obtain enforceable patent rights, thus extending the incentive to commercialize United States innovations in international markets.

Further, the Subcommittee recommends clarification of the scope of patent rights to clearly include new technological advances, and particularly technological advances whose patentability is presently questioned or denied, e.g., new life forms for industrial applications, use-specific chemical formulations based upon unpatentable biologically active ingredients and computer software.

Generally, the proposals are set forth in the order of priority recommended by this Subcommittee.

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room for further innovation and it will continue if provided with a proper environment. Such an environment existed for years and produced outstanding results. Our patent system contributed significantly to an environment which promotes innovation.[1] Unfortunately, there have been disturbing recent indications that there has been a decrease in the rate of innovation and in that portion of the R. & D. investment devoted to new product lines and basic research.

Capital investment is growing more slowly in the United States than it is elsewhere: 14 percent in the United States, 30 percent in Japan, 20 percent in Germany, and the United States trading position, even in high technology products, has deteriorated.

An even more dramatic indicator of the innovation decline is evidenced by the recent decrease in investment capital obtained by business. This decline can be readily seen from the following table that shows the capital acquired by firms with less than $5 million in net worth from public offerings since 1969:

Year	Number of offerings	Total amount (millions)
1969	548	$1,457.7
1970	209	383.7
1971	224	551.5
1972	418	918.2
1973	69	137.5
1974	8	13.1
1975	4	16.2

The catastrophic decline in capital obtained by small businesses is apparent, and the trend extends to other sources of small business financing, including professionally managed venture capital sources and high-risk investments by individuals.

There has been a net decline in total United States expenditures for R. & D., as measured in constant dollars, since about 1970.[2, 3] That decline was the result of a significant cutback on R. & D. spending by the Federal Government in the last 10 years, particularly in aerospace research. Industrial R. & D. has shown an average real growth rate of about 2 to 3 percent annually. The data do not suggest a decrease in resources applied to R. & D. by the private sector. However, some analysts support the idea that there has been a shift in the emphasis of R. & D. from a search for new technology to upgrading existing technology and compliance with government regulations.

The high technology industries have the largest concentration of R. & D. effort. The ratio of R. & D. expenditure as a percentage of sales has remained fairly constant, the ratio being higher for high technology corporations than low technology corporations.

Despite the fact that United States industrial R. & D. has not declined, in high technology areas there has been a substantial increase in the number of patents granted to foreign companies. Of the patents granted to U.S. residents in high technology areas, the large majority are owned by corporations and very few individuals. In certain high technology fields, such as drugs and chemicals, about 90 percent of the patents are assigned to corporations, rather than individuals.[4] Individuals tend to own relatively more patents in less technical areas. At least in part, this is explained by the high cost and complexities of doing research in high technology areas, again underlining the need for effective patent support in those innovative businesses.

The total number of patents issued annually has declined since 1971,[5] suggesting a decline in innovation; however, when considered on the basis of filing dates, the changes are small, with only a slight downward trend. There has been an increase in the number of patents granted annually to foreign residents and a decrease in the number of patents granted to U.S. residents. The share of U.S. patents issued to foreign applicants has doubled in the last 14 years. These data suggest that inventors in other countries are becoming more active, rather than a sharp decline in the rate of U.S. invention. Further, the data suggest that U.S. innovators are facing increased competition from innovators in other countries.

Individuals and the full range of firm sizes, from small to large, are important to the innovation process. An adequate patent system is important to all, and is often critically important to individuals and small firms.

Some studies have shown that small firms produce major innovations at a higher rate than large firms,[6] although it has been suggested that larger firms may have fewer major innovations per R. & D. dollar, because they produce more expensive innovations.[7]

Small firms tend to put to commercial use a higher percentage of their patented inventions than larger firms,[8] although both large and small firms report about the same percentage of patented inventions as being useful when, in addition to commercial use, licensing and other purposes are considered.[9] Patented inventions appear to have a greater effect on reducing costs of commercial production in large firms,[10] but a greater effect on increasing sales in smaller firms.[11] Both large and small firms report that the net return on patented inventions varies over an extremely wide range,[12] which is some evidence that the number of patents, as such, fails to meaningfully measure the worth of patented

[1] Robert F. Dale and James K. Huntoon, "A Cost-Benefit Study of the Domestic and International Patent System," *Idea*, Volume 3, No. 3, fall 1967, page 351, used several different methods to approximate the benefits of the U.S. patent system, which resulted in benefit-cost ratios ranging from 5:1 to 50:1, with monetary benefits in the range of $2 to $15 billion annually (page 405).
See also Robert B. Benson, "Patents In Our Free Enterprise System," presented at the John Marshall Law School February 20, 1976, attached as appendix C.

[2] *Science Indicators*, National Science Board, 1976, pages 108 through 115.

[3] Business Week, July 3, 1978, page 58.

[4] *Supra*, footnote (2), page 112, table 4–22.

[5] *Supra*, footnote (2), pages 95 through 105.

[6] *Science Indicators*, National Science Board, 1976, pages 35 through 41.

[7] *Supra*, footnote (6), page 118.

[8] B. S. Sanders, "Patterns of Commercial Exploitation of Patented Inventions by Large and Small Corporations," *PTC J. Res. & Ed.*, volume 8, No. 1, spring 1964, page 51, at page 53.

[9] *Ibid.*, page 74.

[10] *Ibid.*, page 79.

[11] *Ibid.*, page 77.

[12] *Ibid.*, page 89; see Appendix B.

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of patent rights can be resolved quickly and inexpensively. Also, the availability of reliable patents encourages decisions to disclose inventions through the patent system; and, disclosure of inventions in patents appears to exert a stimulative effect on competitive R. & D.[32]

The Subcommittee has identified four major goals to which attention must be addressed to enhance the innovation process through improvement of the present patent system.

(1) Enhancement of the reliability of the patent grant to the inventor and those investing in the commercialization of his invention;

[32] *Ibid.*

(2) Reduction in the cost—both in time and money—of judicial enforcement of the rights derived from the patent;

(3) Clarification of the availability of commercial exclusivity derived from patents for new technological advances; and

(4) Development of systems transferring the commercial rights to government-supported inventions to those in the private sector capable of their innovation.

Sections 2 and 3 of this report set out the Subcommittee's recommendations to enhance the innovation process by improving the patent system in the above-identified areas.

Section 2

PROPOSALS WITH MAJOR IMPACT ON INNOVATION

This section contains those proposals which the Subcommittee feels would have a major impact on stimulating innovation. All members of the Subcommittee urge prompt implementation of the substance of these proposals.

PROPOSAL I.—UPGRADE THE PATENT AND TRADEMARK OFFICE

The Subcommittee strongly recommends that the Patent and Trademark Office (PTO) be given sufficient funds and resources to thoroughly and carefully process patent applications so that the reliability of resulting patents is greatly improved and the enforceability of such patents is enhanced. This is imperative to the making of sound decisions on investment in innovation.

The basis of a good patent system is a good search and an examination which results in a clear definition of the invention. PTO patent examiners presently spend an average of 15 hours in examining each patent application, including reviewing and understanding the disclosure and the claims; conducting a search of the prior art, including United States and foreign patents and the literature; writing an action either allowing or rejecting some or all of the claims, and giving reasons why the claims are believed to be unpatentable; reviewing the response filed by the applicant or his attorney to such action; conducting a further search and either granting or refusing the patent. In the latter event, another action is prepared again setting forth the reasons for rejection so that the applicant can decide whether an appeal should be taken.

The most important part of the examination procedure is the search of the prior art by the examiner. This is done manually by him. Because of time pressures placed on the examiner and the inherent limitation of the examiner's search file, he cannot search all of the literature published throughout the world which may contain pertinent references. Applicant and his attorney are required to assist the examiner in this process by citing information of which they are aware which is material to the examination; however, applicant and his attorney are not always aware of the most relevant art.

Failure by the U.S. examiner to find and cite pertinent prior art results in the issuance of patents which contain claims that do not accurately define the scope of protection to which the invention is entitled, and thus are not given a high degree of acceptance in practice and are more vulnerable to attack in the courts. Infringers involved in patent litigation and who cite prior art not cited by the examiner (even art that is not more pertinent than the cited art) have greater success in convincing courts to invalidate the patents over such new prior art.

The PTO handles approximately 103,000 new patent applications per year with a staff of 3,000 people (approximately 1,000 examiners) and a budget of $93 million. By contrast, the European Patent Office (EPO) is projecting an annual load of 40,000 patent application filings with a staff of 3,000 people and a budget of $115 million. Such an EPO budget, if scaled up to handle the load handled by the PTO, would be two and a half times the current PTO budget. An explicit goal of the European Patent Office is to conduct high quality examinations for the purpose of reliability and predictability. The subcommittee feels that the United States should have the same goal.

In light of the foregoing, the subcommittee submits that the PTO should be given the funds [1] and resources to improve its examination procedure and thereby to

[1] If the PTO is given increased funding, consideration should be given to raising at least a portion of such funding through higher fees. The Government Accounting Office has proposed that the PTO recover in fees 55 percent of its costs (it now recovers 32 percent of its costs; see *Chemical and Engineering News*, November 27, 1978). The Subcommittee feels, however, that excessively high fees could constitute a disincentive to innovate on the part of individual inventors and small firms. Any steps taken to raise additional income from PTO operations should, accordingly, give special consideration to providing relief for individuals and small firms.

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tem; in the interim, the Subcommittee encourages the Commissioner to continue to use his rule-making authority in this regard.

The net effect of this Subcommittee's proposal for reexamination would be to provide a simple, inexpensive method of greatly improving the quality and reliability of those U.S. patents which have demonstrated commercial value and to avoid expensive and wasteful procedures with respect to noncommercial developments. It would also provide a system whereby competitors of the patentee can request a more accurate definition of the invention (claims) as guidance in their efforts to legitimately compete with the patentee.[5]

PROPOSAL III.—PROVIDE A SPECIALIZED APPELLATE COURT FOR PATENT CASES

This Subcommittee favors a centralized national court with exclusive appellate jurisdiction (subject to Supreme Court review) over patent-related cases as a vehicle for insuring a more uniform interpretation of the patent laws and thus contributing meaningfully and positively to predicting the strength of patents.

The present judicial system for reviewing patent disputes has generated extensive differences in the various circuits' *application* of the patent law which has inordinately increased litigation expenses (by encouraging forum shopping) and made it extremely difficult for patent lawyers to advise their clients as to the likelihood of success in a given case.

It is the view of this subcommittee that the uniformity and reliability made possible by a centralized patent court would contribute meaningfully to decisions to file patent applications and to commercialize inventions, thereby improving industrial innovation in the United States. Consistent decisions in patent cases would greatly aid attorneys in advising their clients as to the strength of patents, thus reducing uncertainty in commercializing both patented inventions and noninfringing alternatives.

This Subcommittee favors the general concept of a special national court to hear patent appeals, such as the court proposed by the Department of Justice which would be formed by merging the Court of Customs and Patent Appeals with the Court of Claims, plus a few new judges. The new court would retain the present jurisdictions of these courts and acquire additional jurisdiction now exercised by Circuit Courts of Appeal over patent, civil tax, and other cases. In the view of the proponents of the DoJ plan, the new court would overcome many of the perceived deficiencies of a specialized patent court while, *inter alia,* providing advantages such as the following:

> "This proposal would also resolve the myriad evils caused by fragmented review in tax, patent, and environmental litigation. The rampant lack of uniformity between the Tax Court, the district courts, the Court of Claims, and the regional courts of appeals would be cured. The forum-shopping common to all three areas of litigation would be cured. Business planning would be made easier as more stable law is introduced in all three critical areas. Concentration of this litigation would help develop expertise in handling the cases. The background and training of most of the members of the CCPA, some of the members of the Court of Claims, some of the Trial Commissioners, and the CCPA's technical advisors would materially aid the resolution of patent and environmental cases, but the court having 15 members would not be dominated by specialized judges." [6]

For the foregoing reasons, this Subcommittee supports the concept of a national court having exclusive patent jurisdiction.

PROPOSAL IV.—REDUCE COST OF PATENT LITIGATION

One of the major problems which, to some, makes the patent system not nearly as effective as it should be is the cost and time involved in resolving patent infringement and validity disputes through litigation. This is particularly serious for the individual inventor and small company because they can neither spend the time nor the substantial expense which frequently exceeds $250,000 per party in a patent infringement suit.

In order to encourage innovation through the patent system, ways must be found to reduce the cost of patent litigation, and a decision on patent disputes must be available within a reasonable time.

The Subcommittee recommends that the Supreme Court, through the Judicial Conference, require each Federal court to exercise a high degree of control over the conduct of patent litigation, with particular concern for the time and expense of discovery. The Subcommittee specifically recommends the approach to patent litigation proposed by Howard T. Markey, Chief Judge, U.S. Court of Customs and Patent Appeals. Those proposals are reproduced in appendix E.

In addition, it should be noted that each of our earlier proposals will tend to reduce litigation costs. Proposal I will reduce the number of patents litigated by reducing the number of invalid patents issued, and reduce costs in patent litigation by simplifying the issues to be considered by the court. Proposal II will do the same. Proposal III will reduce the number of patents litigated by enhanced predictability of the outcome of litigation, and reduce litigation costs by concentrating expertise in the new court.

PROPOSAL V.—TRANSFER COMMERCIAL RIGHTS TO GOVERNMENT-SUPPORTED RESEARCH TO PRIVATE SECTOR

The U.S. patent system is designed to stimulate the progress of the useful arts by encouraging the public disclosure of new technology and making available to the public new products and processes utilizing this technology. The patent grant has played an important

[5] See appendix H.

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Trademark Office. A decision not to file patent applications on behalf of the Government would result in the PTO having available a substantial portion of the 3 percent of its total capacity that could be directed to reducing the backlog in the PTO and handling special problems that have been created by the new reissue program and the anticipated reexamination procedures. In addition, this decision would save the time of government patent attorneys who normally prepare and prosecute the patent applications and the cost of having patent applications prepared by attorneys in private practice. Time and money thus saved could be utilized to provide needed services in other areas of the Government.

According to this Subcommittee's proposal, the decision to file a patent application would be made by the university or contractor; in the case of inventions made by government employees at government expense, the decision to file would be made by the employee, if he were to retain title, or by the independent nongovernmental organization (suggested above), which would obtain title to the patent.

The Subcommittee recognizes the argument that the Government applies for patents to preserve its right to institute an interference with patent applications from the private sector. However, such interferences are a very rare occurrence under present practices. Furthermore, establishment of prior invention by the Government would generally constitute a defense in an infringement suit on the basis of prior invention. Prior invention may not be an adequate defense in instances where the Government has not reduced the invention to practice, or has, for good reasons, kept the invention secret; special legislation may be required to provide adequate protection to permit royalty-free government use in such instances.

Section 3

OTHER PROPOSALS WHICH WOULD INCREASE INNOVATION

In addition to the proposals noted above, this Subcommittee endorses the following proposals, which, in the opinion of at least a majority of the Subcommittee, would result in significant stimulation of innovation.

PROPOSAL VI.—EXTEND PATENT TERM TO COMPENSATE FOR DELAYS IN COMMERCIALIZATION CAUSED BY GOVERNMENTAL REGULATIONS

There are circumstances where extension of the term of the patent may be appropriate to insure that the rewards from the patent system enhance innovation. It is recognized that innovators of many different types of products may not lawfully vend such products within the United States without securing from various Federal agencies such as the EPA, FDA, etc., premarketing approval. Inevitably such approvals require considerable testing of the product over a long period of time to establish environmental acceptability, safety and, for some products, efficacy. Improved efficiency in the examination of patent applications by the Patent and Trademark Office results in the grant of patents to the innovator of such products long prior to Federal approval for marketing of the product, resulting in a shorter patent-assured exclusivity period than the 17 years contemplated by Congress. This inequity could be remedied by legislation which would permit extending the patent term to compensate for delays in commercialization caused by governmental regulations. Such legislation would be similar in principle to current legislation which provides for the delayed issuance of patents to inventors when, for security reasons, their patent applications are prevented from issuing in the normal course (35 U.S.C. § 181 and 183).

Some members of the Subcommittee feel that the proposed extension of patent term could cause difficulties in planning for competitive activities at normal patent expiration.

PROPOSAL VII.—ENCOURAGE OTHER COUNTRIES TO PROVIDE U.S. INNOVATORS THE RIGHT TO OBTAIN ENFORCEABLE PATENT RIGHTS

During the past 10 to 15 years, steady erosion of patent protection available for inventors of all countries, including the United States, has taken place in many foreign countries. This was due to agitation by certain economists and politicians in developing countries acting on the national scene, as well as through and with the help of intergovernmental organizations, particularly agencies of the United Nations. It is being incorrectly asserted by these circles that the patent systems in developing countries benefit only foreigners, and therefore maintenance of a strong, efficient patent system is not in the best interest of these countries. Mainly as a result of these activities, in large geographical areas of the world—notably, in Latin America, Asia, and Oceania (with the exception of Japan, Australia, and New Zealand) and in Africa (with the exception of South Africa)—no effective patent protection exists at present. This development, which is continuing and is gaining momentum, has an adverse effect on U.S. industry, particularly those segments which are most research-intensive.

The extent of the funds which U.S. industry can make available to finance R. & D. activities is directly dependent upon the amount of domestic and foreign sales and profits realized. The loss of sales and profits, through inability of U.S. enterprises to obtain effective patent protection in many countries for the results of their R. & D. activities, could have a direct negative

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mittee Reports (Senate Committee Report No. 315, 71st Congress, 2nd Session, and House Committee Report No. 1129, 71st Congress, 2nd Session) accompanying the bills (S. 4015 and H.R. 11372) resulting in the Plant Patent Act of 1930, it is pointed out that Congress refused to provide coverage for the mere discovery of wild varieties of plants. It is argued that however meritorious the discovery of a new and useful micro-organism in the wild state, like the wild variety of plant, such micro-organism even after culturing remains the same as its relatives in the wild state awaiting rediscovery by others.

Therefore, the culture should not be patentable. However, there is already some case law supporting the patentability of substances extracted and concentrated in purified form, and there are good reasons for this. The purified form of the micro-organism did not exist in nature, would never have been available but for the work of the researcher, and the benefits to the public would not have been available. Thus, there is logic for saying that the purified form is a manufacture, was certainly not obvious and patentability should attach. The availability of patents in this instance is certainly a stimulus to innovation, just as in the pharmaceutical fields, and seems justified for that reason.

In the case of the genetically modified bacteria as in *Chakrabarty,* there is a strong argument that a new "manufacture" clearly exists. As such, the argument of availability in nature does not attach, and the only contention against patentability is the proposition that Congress did not intend to afford the patent grant to living organisms. This contention is based at least in part on the fact that it took a special statute to make plants patentable and that the same is needed for other life forms. (This argument of course also applies in the case of the pure culture.) The counter to this is that Congress when it has passed patent statutes over the years could not possibly have foreseen what man would evolve in the way of manufacture. Space vehicles, jet engines, computers, etc., were certainly beyond the imagination of the national legislature when it provided for the first patent coverage, but yet there has never been any question as to these. If the progress of science is in the national interest, the term manufacture should be construed broadly, and patentability afforded to the useful bacteria resulting only from the efforts of man.

Another argument in favor of patenting certain new, useful and unobvious life forms is that it provides an alternative to the less desirable avenue of trade secrets. Practically speaking, an industrial user must fully contain the micro-organism within his facility lest the trade secret be lost. Such containment will increase the costs of the process or product, costs which inevitably are passed on to the consumer. Maintenance of trade secrets also tends to stifle the free exchange by technology and hinders the progress of science by postponing the benefits to mankind of these technologies. Unhindered by the threat of piracy, there will be stronger incentives to invest money in new and useful technology under the protection of the patent system. In the circumstance where the living invention is itself placed in the stream of commerce, it is impossible to maintain it as a trade secret. There the protection of the patent system is needed to stimulate investment because once the invention is used, it is disclosed to the world.

B. Use-Specific Chemical Formulations

United States industry has effectively competed in the development of agricultural and pharmaceutical products of benefit to mankind here and throughout the world—and have made a major contribution to the U.S. balance of trade in these fields. Major fields of research in this application of the life sciences relate to the development of chemical formulations (such as herbicidal emulsions, insecticidal solutions, and pharmaceutical tablets) which include as the essential ingredient in their composition a chemical which exhibits a newly discovered biological activity. These formulations, after appropriate testing for environmental and health safety and efficacy, become commercial entities and important to agricultural and health. Under the present interpretations of the patent laws, protection is often denied to such chemical compositions if the biologically active chemical is not itself patentable. Patent protection available under such circumstances has usually been limited to method of use patents to be asserted only against those actually using such chemicals in the agricultural or pharmaceutical application of such products, i.e., against one spraying crops, ingesting the pills, etc. In such instances, courts have concluded that the patent owner is extremely limited in the enforcement of his patent against those who similarly formulate the active ingredients that it may be used in accordance with the patentee's teachings. The Subcommittee believes that the limitation of useful patent protection for such use-specific formulations has had an adverse effect on investment in innovation in such fields. To encourage testing and innovation of old chemical compounds, unpatentable as such, for their potential use in agricultural and pharmaceutical applications, the Subcommittee recommends that patent protection be extended to such use-specific formulations of chemical compositions, since the composition is rendered novel by the inclusion of the active ingredient for the new use. Without such a possibility for effective patent support, discoveries of new biological uses for known compounds will not enter the innovation sequence because of the recognized high cost of innovation in these fields.

C. Patentability of Computer Programs

This topic is developed more fully in the report of the Information section of the Subcommittee. However, the Patent section of the Subcommittee feels that patent protection should be accorded to computer programs and computer software, provided that the subject matter thereof meets the statutory definition of patentability.

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Section 4

OTHER MATTERS CONSIDERED

In addition to the proposal discussed above, the Subcommittee considered a number of other proposals and recommendations which are set out in this section of the report.

This Subcommittee makes no recommendations with respect to these matters, either because of lack of time to complete a thorough study or lack of consensus as to the wisdom of adopting these proposals (some of these proposals were rejected; others seemed to the Subcommittee to have a small impact on innovation).

A. COMPENSATION OF EMPLOYED INVENTORS

The Subcommittee as a whole agreed that corporations should be encouraged to continue to motivate their employees to participate in all phases of the innovative process. Awards, promotions scientific recognition, release of unused inventions to the inventors, and other systems are presently being used successfully throughout industry in the United States. The Subcommittee applauds the use of such systems and encourages their expansion to include such things as public recognition of innovators.

Some members of the subcommittee proposed that legislation requiring corporations to give employees a greater stake in their inventions would be a stimulus to innovation. The Subcommittee conceded that such legislation might increase the number of invention disclosures but not have a positive effect on the overall innovative process. In fact, the Subcommittee felt very strongly that an attempt to apply a uniform system on all corporations (such as is done in some European countries) would result in a significant decline in overall innovation and could have the additional negative impact of flooding the Patent Office with patent applications directed to inventions of little or no commercial value. The results in countries that have initiated such systems bear out these results. The attached paper submitted by Mr. Richard C. Witte (appendix G) entitled "Implication of a Federal Law Providing Employed Inventor Awards" sets forth in greater detail the implications of such proposed legislation.

Mr. Richard L. Garwin's paper presented to the Subcommittee on November 16, 1978, and Mr. Eric P. Schellin's paper submitted to the Subcommittee on December 8, 1978, set forth proposals for dealing with the inventions of employed inventors. Both papers are included in appendix G.

B. FINANCIAL STIMULUS OF INNOVATION

The Subcommittee did not have the time nor the availability of information as to what the Government has been doing or is authorized to do in providing either venture capital to individuals or small businesses or financial assistance to inventors. Certain areas in which the Government is already active have been identified as warranting special attention in the area of energy-related innovations and in the area of encouraging minority enterprises. Insofar as this activity may have been successful, other areas should be identified. As the concept of such assistance is believed to provide societal advantages, it is recommended that this type of assistance be provided in those additional identified areas.

C. INFRINGEMENT OF U.S. PATENTS BY THE U.S. GOVERNMENT

Unfortunately, many agencies of the U.S. Government appear to have a policy of doing as little as possible to resolve an administrative claim against them for patent infringement. A recommendation is that the Executive Branch of the U.S. Government issue orders to all Government agencies that any agency must render its final opinion on all claims for patent infringement no later than 6 months after the initial claim is filed. If such decision is not rendered at this time, it will be presumed that the patent is valid and infringed, and the agency cannot rebut this presumption.

D. DIFFERENT CLASSES OR FORMS OF PATENTS

Incontestable Patents

A trademark, after a certain period of use, can be regarded as incontestable, with certain exceptions, upon filing an appropriate affidavit.

One proposal considered by the Subcommittee was that, 5 years after a patent has issued, it would be incontestable with respect to section 103 (obviousness over the prior art) and, with respect to prior art, it could only be held invalid under section 102—in effect, if the invention was, for all practical purposes, identically shown in the prior art. This would have the result that a patent could not be held invalid for obviousness over the prior art after a period of 5 years had passed after it was issued by the U.S. Patent and Trademark Office.

As section 103 obviousness is probably the major ground for invalidity of patents, incontestable patents could significantly reduce the cost of litigation, although a patent could still be held invalid if it was clearly shown in the prior art as provided for by section 102 and for the other reasons provided in section 102 and other parts of the various patent statutes.

Another suggestion was that a patent could be held incontestable against all attacks, rather than only section 103 attacks.

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Patent Term to Run 20 Years From Earliest Effective U.S. Filing Date

The term of a U.S. patent now extends for a period of 17 years from the date of issuance. Measuring the term from this date sometimes results in patents which expire long after filing, for example, when the patent application is involved in an interference or lengthy appeal.[10] Setting the patent term to run 20 years from filing would prevent late issuing patents from disrupting industry, but could be inequitable to patentees whose patents had not issued promptly.

F. IDEAS FOR REDUCING THE COST OF LITIGATION

I. Expert Panel to Decide Patent Litigation

(1) A complaint is filed in Federal District Court by a patent owner or by a possible infringer under the usual declaratory judgment procedure.

(2) Within 10 days of the time the complaint is responded to by the defendant, the plaintiff and defendant must each select a patent lawyer who has been registered to practice before the U.S. Patent and Trademark Office for a period of no less than 10 years and who must have never represented, or been an employee of, the party selecting him, nor can he have ever been associated in patent practice with counsel of the party selecting him.

(3) Within 10 days after both patent lawyers are selected, they in turn must select a third patent lawyer, making a panel of three.

(4) Patent lawyers, whether in private practice or employed by corporations, universities, government agencies, etc., should be willing, if they believe that the patent system is of value to the public, to give some reasonable amount of time, on a *pro bono* basis with their actual out-of-pocket expenses, being paid, to sit on such three-lawyer panels, once within each 3-year period.

(5) There will be no discovery by either side and the three-lawyer panel has the power of subpoena and discovery if necessary. However, the lawyers for each side would formally or informally suggest areas which should be looked into. The panel will, on its own initiative, look into any of these areas and any other areas they wish, and may obtain answers from individuals, corporations or from counsel on each side, subject of course to the usual attorney-client privileges, work product, etc. They may, in effect, ask questions similar to interrogatories, may receive testimony from individuals and should act on their own initiative to uncover whatever facts they feel are necessary to perform their function as set forth below.

(6) Within 4 months from the time the last lawyer is selected (1-month warning period and 3 months in which to perform their duties, although it is contemplated that only a certain number of days within this period would be necessary), the three-lawyer panel will render an opinion on the following items:

(a) Patentability under section 102 (invention was patented or described in a printed publication before the invention date, etc.).

(b) Section 103 (obvious over the prior art of section 102).

(c) Section 112 (adequate description and specific claims).

(d) Section 185 (patenting the invention overseas without the appropriate "export" license required in section 185).

(e) Fraud on the Patent Office in procuring the patent.

(f) Possibly other areas.

(7) When all information regarded as necessary by the panel is obtained, copies of it would be forwarded to the Board of Appeals of the U.S. Patent and Trademark Office.

(8) Both the Board of Appeals and the patent lawyer panel would prepare a written opinion with neither having the benefit of the other's opinion.

(9) If both opinions agreed in substance (the patent is valid and infringed, invalid, not infringed, etc.), that would be regarded as a final decision which could only be appealed to the special Appellate Court proposed herein (see proposal III, section 2).

(10) If the patent suit, as is often the case today, involved other issues such as antitrust, etc., the case could be forwarded to the U.S. District Court which would be bound by the two opinions if the two opinions agreed with each other. If they did not agree, the District Court could use them for what they were worth.

Advantages—Costs would be comparatively low because there would be no money paid to the lawyer panel nor to the Patent Office Board of Appeals, the only costs being providing secretarial and clerical services to the patent lawyer panel. It is felt that if the patent lawyer panel were actually on a *pro bono* basis, they would be able to complete their investigation and reach their decisions very quickly and get back to their normal practice.

II. Amend sections 102a and b to provide that prior use mentioned in these two sections would have to be a substantial amount, such as selling price of the products involved being at least $10,000, or the products being sold in a quantity of at least 1,000 units. Public use by the inventor, on the other hand, would continue as present law provides.

Much patent litigation is involved with wide-ranging discovery in an attempt to find prior public use by

[10] See *Forbes*, September 15, 1977, page 204:

"Last month the U.S. Patent Office threw a stunner into the laser industry. After years of temporizing, it granted key patents potentially covering 90 percent of the lasers in this country to a physicist named R. Gordon Gould. Not that the industry had never heard of Gould. His claims had been around for years, and Refac Technology Development Corp. of New York, which finally pressed the claims, was not the first patent licenser Gould had approached to represent him.

"What exasperates the laser-makers, beyond a potential liability for Gould patent infringement, is the fact that they thought they were already paying royalties (2 percent) to the owner of the basic laser patents through Research Corp., another licensing firm."

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leveraging powers of the patentee. Such a study could well suggest appropriate remedies.

The Subcommittee heard several expressions of concern over Department of Justice attitudes toward joint ventures in R. & D. projects. Antitrust liability in such a case would be predicated on the theory that joint activity by two parties, who might possibly engage in the same activity individually excludes competition by having one party in the field instead of two. Alternative attacks might be directed against the pooling and cross-licensing of patents resulting from such joint ventures. Although the Department of Justice almost invariably approves plans for such joint ventures when presented to it in advance, the situation might be clarified by the addition of the following sentence to 35 U.S.C. § 262: "The legality of joint ownership of patents under the antitrust laws shall be determined by the rule of reason."

The proposed amendment would be intended as a codification of existing case law, and not a major change. However, it would provide a statutory basis for arguing the legality of any particular joint venture.

H. MISCELLANEOUS

(1) Negotiations conducted by the U.S. Government Relating to International Technology Transfer.

The U.S. Government should consider making it mandatory on all their international negotiating meetings at the United Nations and at other places to include people from the private sector who are expert in the matters being discussed. This should not be taken as a recommendation that a delegate should be appointed to make sure a large corporation's interests are taken care of. The value of an expert from the private sector is that such an expert can point out to the U.S. delegates and, sometimes more importantly to delegates from other countries, the practical results and impacts of a particular proposal which may have exactly the opposite end effect that it appears to have on its face.

(2) Unpatented technology is important to protect from misappropriation in order that those who invest in research and development may obtain a proper return on that investment. It follows from this that mechanisms should be developed by which such unpatented technology is not misappropriated from its proprietor through the activity of governmental regulation and other disclosures to the Government, coupled with requests by competitors for information under FOIA —a source of industrial espionage which is now commonly in use.

(3) Make it a crime for anyone to knowingly infringe a valid patent.

(4) Change to a first-to-file system, so that the first applicant to file on an invention would be entitled to the patent. Our current patent laws award the patent to the first-to-invent (provided certain conditions are met), rather than the first-to-file.

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4-25. Invention and ownership of patents granted in 30 active patent fields, and of all U.S. patents granted in 1975

Invention or ownership	Percent of patents: 30 active patent fields	Percent of patents: All U.S. patents
Foreign invention	43	35
U.S. corporation ownership of U.S. inventions	89	71
U.S. Government ownership of U.S. inventions	3	4
U.S. individual ownership of U.S. inventions	7	24
Foreign ownership of U.S. inventions	1	1

Source: Office of Technology Assessment and Forecast, U.S. Patent and Trademark Office, *U.S. Patent Activity in Six R. & D. Intensive Industries* (1976), (a study commissioned specifically for this report), and Office of Technology Assessment and Forecast, U.S. Patent and Trademark Office, *OTAF Special Report—All Technologies* (May 1977), unpublished.

4-24. Percentage of U.S. patents owned by U.S. individuals, in product fields with the highest percentages in 1975

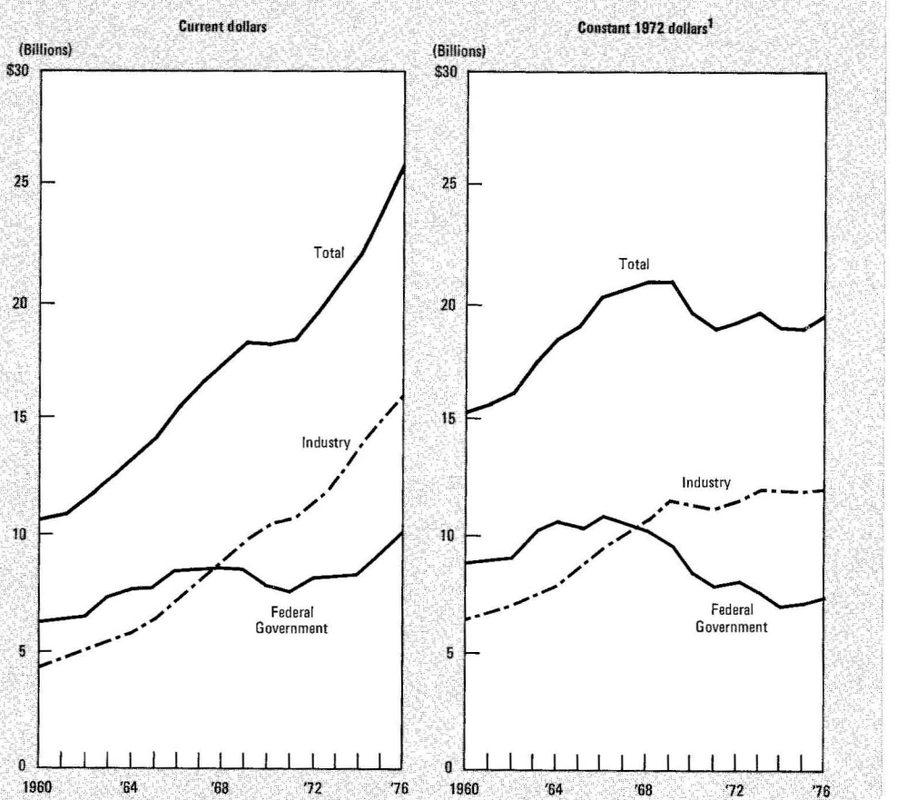
Product field	Percent of patents in each product field[2]: 1965	1975
Ship and boat building and repairing	44	44
Farm and garden machinery and equipment	46	43
Miscellaneous transportation equipment	33	37
Construction, mining and materials handling machinery and equipment	38	36
Refrigeration and service industry machinery	33	35

[1] Due to U.S. inventors.
[2] By date of patent grant.

Reference: Appendix Table 4–14.

4-1

Expenditures for industrial R&D by source of funds, 1960-76



[1] GNP implicit price deflators used to convert dollars to constant 1972 dollars.
NOTE: Estimates are shown for 1975 and 1976.
REFERENCE: Appendix Table 4-1.

0
1960
'64
'68
'72
'76
0
1960
'64
'68
'72
'76
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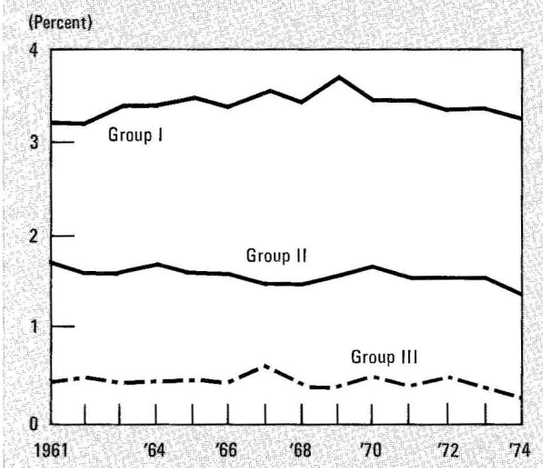
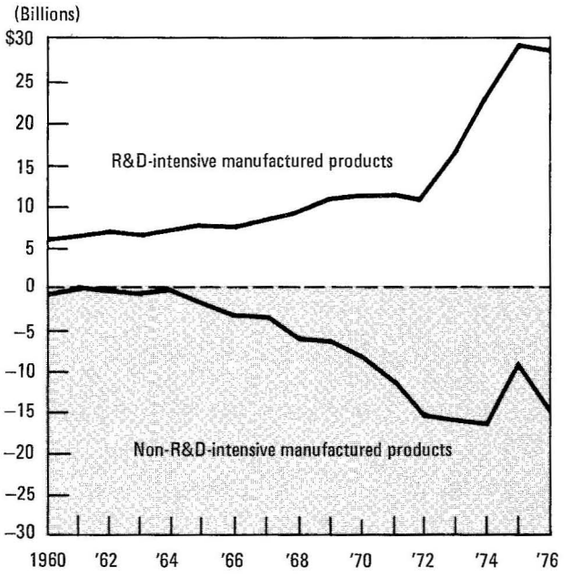
Company funds for R&D as a percent of net sales



1-28

U. S. trade balance[1] in R&D-intensive and non-R&D-intensive manufactured product groups, 1960-76



[1] Exports less imports.

REFERENCE: Appendix Table 1-23.

APPENDIX B

Summary Statistics Derived from Assignee Replies of Net Dollar Gains or Losses Realized up to the Date of Reporting from the Commercial use of Sampled Patented Inventions (1938–55) and for all used Patented Inventions Related to Corporation Size Based on Net Sales in 1949.[1]

Corporations grouped according to net sales in 1949	Patented inventions relating to net gain—all used patented inventions			
	Mean	*Median*	*S.D.*	*No.*
Largest corporations	$1,303,786	$39,000	$3,830,643	14
Second largest corporations	167,780	37,000	244,014	14
Third largest corporations	1,001,545	240,681	1,634,824	8
Fourth largest corporations	115,586	13,500	240,172	18
All listed corporations	568,423	24,500	2,124,357	54
Smallest corporations (nonlisted)	134,955	20,000	332,438	22
Total	442,945	22,000	1,810,295	76
	Patented inventions for which net losses were reported			
Largest corporations	$5,348	$5,348	0	1
Second largest corporations	76,000	76,000	$64,000	2
Third largest corporations	31,000	31,000	19,000	2
Fourth largest corporations	8,074	7,500	6,497	5
All listed corporations	25,972	10,000	40,260	10
Smallest corporations (nonlisted)[2]	65,643	10,000	136,651	7
Total	42,307	10,000	94,993	17

[1] From B. S. Sanders, *PTC J. Res. & Ed.*, Vol. 8, No. 1 (spring, 1964).
[2] Corporations having less than $100 million assets and owning less than 75 patents issued between 1939–55.

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that under our patent system the real rewards to the inventor are not given by the Patent Office or the Government, but rather are determined by whether the invention has commercial value. Incentives for motivating individuals are the very heart of the free enterprise system, and the patent system, when functioning properly, works along free enterprise principles.

Our patent system is self-regulating in the sense that it is the public willingness to purchase the patented product that ultimately determines the monetary return to the inventor. Thus, greater inventions can earn a large reward and there may be no reward for inventions which prove to be devoid of practical merit or market acceptability.

It might be well to mention at this time that the exclusive right or monopoly, as some people call it, granted to an inventor through the process of obtaining a patent does not deprive the public of anything, but rather gives to the public something it never had before and would not know about if it were not disclosed in the patent. While critics may counter this statement with the supposition that such inventions eventually would become public knowledge, I think that even if true, there are significant advantages to the public to have this information sooner rather than later. Some of the world's most important inventions were made only after studying the information contained in a recently issued patent.

The myth that by obtaining a patent you will be assured that the world will beat a highway to your door is as false today as it was in the days when many of our important inventions were made. It is equally unsound to believe that tremendous financial or manufacturing resources are necessary to make a commercial success of a patented article. As pointed out in "19 Basic U.S. Inventions" published by Allis-Chalmers Corporation, what is necessary is an understanding that the inventive idea must be combined with knowledge and utilization of the patent system and economic laws together with a great deal of perseverance to make even the best of inventions available to the public in order to return a profit to the inventor.

Ted Bowes, in a recent article, pointed out that many of our great inventions represented relatively minor structural deviations from the impractical or unsatisfactory forerunner. As examples, Bowes cites the electric lamp, barbed-wire fence, telephone, induction motor, and air brake. He points out that patents on each of these inventions were involved in extensive litigation, but were upheld in court. The patents afforded these inventions, even though by today's standards might appear to be minor structural deviations, were an essential factor in the evolution of the industries which were founded upon these inventions. In the cases cited above, it is also interesting to note that many years passed before the financial return to the owners of these patents reached a satisfactory level.

In a speech a few weeks ago to the American Patent Law Association, Undersecretary of Commerce, James A. Baker, III, after mentioning the many obvious benefits from the patent system, made the following statement:

> Given the range of benefits that flow from our patent system, one would assume that it would be universally recognized as one of the most useful of our public instrumentalities. In that assumption, unfortunately, one would be wrong. So there is certainly a great need for better public understanding of the patent system, just as there is a need for deeper understanding of the entire free enterprise system of which patents are an inseparable part. We are surrounded, in this country, by a great deal of what has been termed 'economic illiteracy.' "

A few years ago the president of a major pharmaceutical house expressed the view of that industry when he said:

> The value of patents as a stimulus for discovery is clearly understood by those who deal with the issue not in theory but in terms of actual commitments of their company's resources for research. My company is now investing many millions of dollars per year in research and development. I know we could not continue to risk such investments if other manufacturers, domestic and foreign, could share in our discoveries simply by asking, without making any investment in research or any scientific contribution of their own.

Perhaps nowhere in our complex economical, industrial system is the need for patent protection more pressing than in the pharmaceutical industry. It is not unusual for a company to spend 10 to 20 years and many millions of dollars synthesizing a single compound, and these are the kinds of efforts that have made miracle drugs such as penicillin and cortisone available to the public at modest prices. It has been estimated that in the drug industry it takes an average of between 7 and 8 years to bring a new product to the market and that only one of between 1,500 and 3,000 compounds developed in the lab ever reach the market.

A classic example in this field is cortisone, which has proven capable of restoring to productive life over one million Americans who would otherwise be helplessly crippled from rheumatoid arthritis. It was also found to be useful in treating well over 50 illnesses, at least a dozen of which are potentially fatal.

The history of the development of cortisone is a liong one, going back to the 1930's when a Mayo Clinic biochemist, Dr. Edward C. Kendall, isolated six steroids, one of which he believed to be the compound that could effectively treat Addison's Disease. It took many years to identify and synthesize the steroid which eventually became known as cortisone. After the compound was initially synthesized, a new method was worked out for producing the steroid which took 2 years and 20 days to produce an amount of the compound equal to one-half of a gram. Years later after recognition that the drug could be used in treating rheumatoid arthritis and many other illnesses, the compound was being sold at $200 a gram but the company selling the compound was losing money. Now, after much more research and development by competing firms, the price of cortisone has been reduced to less than 50 cents per gram.

Another example is the case of penicillin, discovered by Sir Alexander Fleming in 1929. For almost 10 years

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patents are issued to individual inventors and many more are assigned to small struggling corporations. We all know that the basic inventions for xerography were made by an independent inventor, Chester Carson, during the last 40 years, and that that invention has evolved into a multibillion dollar corporation employing 700,000 people. Perhaps we are overly impressed by the really big success stories which receive so much publicity . . . success stories such as Xerox and Polaroid. However, the U.S. patent system still provides a path that anyone may travel to modest fame and improved economic circumstances. The 1975 edition of the PATENT LAW ANNUAL from the Southwestern Legal Foundation, Dallas, Tex., contains a report by D. Carl Richards on a series of case studies showing how individual inventors and small corporations from all over the United States are successfully utilizing the patent system to found new and thriving companies and provide substantial financial rewards to the inventors involved. While these industries may never grow to the size of the Xerox Corporation, they are still an important element in the day-to-day working of our free enterprise system.

For example, one of the companies he studied was founded by a couple of young ladies who conceived an invention in a converted home garage for improved vitro test methods for thyroid hormone function generally identified as T-3 and T-4 test methods. They obtained a patent, formed a corporation, and within a matter of months were employing 10 people and had sales at an annualized level of $100,000. Three years later a large pharmaceutical company began producing the patented tests and a suit for infringement followed. A negotiated settlement was agreed to. By the end of 1973, this new company was occupying 31,000 square feet of office and manufacturing space, employing 108 people and selling their products throughout the United States, Canada, Mexico, Australia, Japan, and various European countries. Sales were annualized at $4.5 million and the company was paying a U.S. corporation income tax in excess of $600,000.

Counsel for this company expressed the opinion that the growth and the very existence of this company could not have been possible without the protection afforded the company under the U.S. patent system.

What is the future of patents in the free enterprise system? The Senate Judiciary Committee has just passed to the floor of the Senate S. 2255 that contains many provisions that will, in my opinion, have the effect of discouraging the use of the patent system. Not only will the bill, if passed, significantly increase the cost of obtaining and maintaining a patent, it places many more requirements on inventors, which provide additional grounds for invalidating a patent, but have nothing to do with whether or not a legitimate invention has been made and disclosed. In addition, the bill provides for inter partes opposition proceedings, which most of you will recognize from your experience in foreign countries as a very effective tool for harassing inventors. The net effect of the bill, if adopted, will be to make it even more difficult to maintain and enforce valid patents, and make the cost so high as to effectively place the use of the patent system beyond the reach of most independent inventors and small corporations.

All of this indicates that the drafters of the bill do not understand or appreciate the function of patents in our free enterprise system.

In the rest of the world we have an interesting dichotomy. The Europeans continue to work on treaties to modernize the system of granting patents, while improving the quality and reliability of the patents granted. On the other hand, in South American countries and other developing countries, where a strong patent system properly administered would be a boon to their economy, laws are being passed that reduce the value and effectiveness of the patent grant.

In closing, I would like to quote from a speech made by a prominent business executive, Leo Fernandez, a few years ago. I believe that these observations are as valid today as they were in 1969:

> Without patents—and I say this categorically—the pharmaceutical industry could not have made the remarkable contributions to health that have come from its laboratories in the last decades. Nor would it have become an industry with truly international companies, as it is today. But more importantly, without patents the technological revolution that now is reaching the remotest corners of the Earth would be nothing more than science fiction.
>
> Without patents the United States would not have known the prosperity it now enjoys, nor would it have risen to its present position of scientific eminence. In its own self-interest—but even more in the interest of nations that are now experiencing doubts—the United States should become a missionary for patents. They are indispensable for innovation. They are equally indispensable for investment in innovative industry. Developing nations, always in need of investment, must understand this clearly as they look to their futures.

APPENDIX D

Position Statement On The U.S. Patent System

Industrial Research Institute

The Industrial Research Institute (I.R.I.) affirms the basic concepts of the U.S. patent system as originally premised in the Constitution and as they exist today. We believe that the fundamental merits of the patent system are as sound today as they were in the period of industrial growth and respect for patents in the 19th century and in the first half of the 20th century. The Federal patent law still responds to the constitutional objective "to promote the progress of . . . useful arts by securing for limited times to . . . inventors, the exclusive rights to their . . . discoveries." Continued industrial success of the United States requires the

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interference, the current 17 years is satisfactory. However, there continue to be a number of patents, particularly commercially important ones, which have lengthy and complex prosecution of as much as 5 to 10 years because of refilings, appeals, or interferences. This can result in patent terms which expire as long as 22 to 27 years after initial filing. A carefully conditioned term ending 20 years after first filing will provide greater equity and certainty for patent owners and their competitors.

3. Enforceability of a patent is an integral part of the patent system because assertion in litigation is the ultimate test of the basic exclusionary property right of the patent. Many patents are afforded their deserved respect without the necessity of litigation. This respect will be broadened if overall patent quality is improved by better examination. There has, however, historically been a need to litigate patents which involve honest differences of opinion on validity and scope between the patentee and alleged infringer. Unfortunately, such litigation has become complex, lengthy, and expensive, in a large measure because of the scope of discovery; this present difficulties for both the patent owner and accused infringer. Litigation problems have unduly discouraged patent owners, particularly those with limited financial resources, from asserting their patents because a validity determination by a court is expensive and uncertain; and if the patent is upheld, the damages may not be enough to pay for the litigation. This reluctance to assert has encouraged infringement of patents which should otherwise be respected. Litigation expense may intimidate a patent owner into accepting unfavorable settlements. Conversely, a patent owner may intimidate a weak infringer with the expense of litigation. Compounding these problems is the variance in the opinions in the Federal courts regarding patentability standards. Patent owners and infringers jockey to get into courts which favor their own interests. This further adds to the expense and uncertainty of owning patents and making investments in reliance on patents.

The I.R.I. supports legislative and judicial efforts to decrease the expense, uncertainty, and inequities experienced by patent owners and those accused infringers having honest differences of opinion on the validity and scope of a patent. We believe that it would be worthwhile to give careful consideration to a single court of appeals for patent litigation which would speed up patent litigation and make it more uniform and certain. If such a court could institute discovery reform, litigation expenses could be reduced. This concept of a Patent Appeals Court has been controversial because of a prediction that the patent court would be rigid, technical, inflexible, and unable to handle issues ancillary to patent validity and infringement, such as unfair competition and antitrust issues. Even if this prediction were accurate, we submit that the reduction in expense, time, and uncertainty would significantly offset any shortcomings of the specialized court.

Patent Survey Results

This is a summary of the responses to the questionnaire which accompanied the draft I.R.I. position statement on the U.S. patent system, distributed in June 1978 to the 245 I.R.I. member companies. There were 127 responses, which provided yes or no answers to the questions. Many extra comments were also made and the numbers of these are tabulated.

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A. Do you agree with the basic premises of the first two paragraphs?
Yes *100%* No *0%* 21 extra comments.

B. Regarding the U.S. patent system features of merit, do you agree that:

1. The basic requirements are well defined and should not be changed?
Yes *93%* No *6%* No Answer *1%* 24 extra comments.
2. The Patent Office performs generally well:
Yes *86%* No *12%* No Answer *2%* 46 extra comments.
3. Thorough examination is important:
Yes *97%* No *1%* No Answer *2%* 34 extra comments.
It should be balanced with reasonably prompt examination:
Yes *97%* No *1%* No Answer *2%* 27 extra comments.
4. The patent should go to the first-to-invent:
Yes *89%* No *7%* No Answer *4%* 43 extra comments.
5. The one-year grace period should be retained:
Yes *94%* No *5%* No Answer *1%* 31 extra comments.
6. Are there any other features of merit which should be emphasized in the paper?
Yes *32%* No *50%* No Answer *18%* 42 extra comments.

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because in 23 years of practice, I helped bury a few. You will find, too, that I am one of those Irishmen who may not always be right, but who is never uncertain! Seriously, I hope you will be as patient with me as you are with the members of the bar who appear before you, at least during my talk. On the other hand, I hope you will be just as rough as you can in the question period. I don't worry about that very much because if *I* can't answer, and if there *is* an answer, I'm sure I can get it, and the efficient Judicial Center people can get copies off to you afterwards. So please don't hesitate to come up with questions.

Incidentally, this isn't all coming from this Irishman, or even from 23 years of the practice of patent law. I was not so foolish as to suppose that I knew where all the special problems in patent cases were. So when Judge Campbell and Judge Murrah suggested that I make this presentation, I wrote almost a hundred district judges who would not be at this seminar and asked them to give me their ideas with respect to special problems in patent cases. I am pleased to say that I got many responses from some of which I gleaned some of the material of this talk.

There are two special problems in patent cases: you and the lawyers. The first problem—you—is a good place to start.

The first thing about you and patent cases is—you don't like them. Many of you are afraid of them. Some of the judges I wrote responded with, *"Fortunately,* I have never had a patent case." Others wrote back and said, "I am glad to report, I only had two patent cases in 12 years." And those of you who are fairly recent on the bench will recall that you began your career by having all the patent cases dumped on you by your fellow judges.

The view is not limited to district judges; some circuit judges have said to me, "When are you going to take these patent appeals off our back?" Judges Learned and Augustus Hand, both of happy memory, did not dislike patent cases, apparently, but both refused to allow their law clerks to participate in any way in a patent case.

There are good reasons for this dislike, and in some cases fear, of handling patent cases. They are infrequent, as I have just indicated. You don't get them constantly, so you don't get a chance to practice with them and to churn them in your mill as you do other types of cases. Secondly, as a result of that and a lack of experience in the field before becoming a judge, you don't feel confident in either the law of patents or the technology involved. Both are like foreign languages. And then last, but certainly not least, many patent cases consume an inordinate amount of that precious, finite commodity—time.

We can't do very much here about the frequency of the patent cases you will hear, but we may have a few suggestions on your attitude and on saving time.

I propose to discuss for a few minutes your attitude, as I view it from reading numerous court opinions, toward the patent system and toward patent litigation. Obviously, in the few minutes we have here, we can only hit the high spots.

First, I have a question for you: How many of you feel that all monopolies are bad? I am not asking for a show of hands, but well, there's one. Judge, what's your wife doing tonight? I am being facetious in a way, but not really. How about sharing your car with me for the next five years? And with all your neighbors—or your house or your farm or your store? A patent, as the statute says, is property. Like any other personal property, a patent is personal property. Also, just for fun, try to think of a single product line—automobiles, airplanes, lathes, shoes—a single product line that has been monopolized by patents? Patents normally cover new improved models of products. The Polaroid Land camera is patented, but Kodak and Bell & Howell and Minox and numerous other camera companies are hale and hearty. There are different kinds of monopolies; there are bad monopolies and good monopolies. The bad monopoly takes things away from the public that it formerly had, i.e., you and I conspire to take control of most or all of the corn, or automobiles or something else. A good monopoly, in the case of a valid patent, gives to the public something it never had before. So the syllogism "monopolies are bad—patents are monopolies—therefore, patents are bad," is a very dangerous, unfair, unjust, and detrimental-to-our-country approach to take.

The patent plan itself is a very simple plan. You will find it in the Constitution of the United States, Article I, Section 8, Clause 8. Keep in mind, gentlemen, that we begin with the fact that when the inventor made the invention, he *owned* it. The moment he made it, he owned it. The patent system, among other things, provides an incentive for him to *disclose* it, so that someday soon (in the history of a country, 17 years is very soon) it will belong, free, to the public.

Americans are not the only people in the world with brains. You cut open the brain of any citizen of any nation and you will find the same gray matter. Why then do you see all around you these marvelous technological advances that you do not see elsewhere in the world? Because we have had a system which has produced the *incentive* to *disclose* inventions and the free economic environment which encouraged their *production.*

Now what is the patent right? It has nothing whatever to do with the right to make a product. It is totally and simply the government's agreement to enforce the inventor's right to exclude others. Again, the inventor had, at the moment he made the invention, the power and right to exclude the whole world—all he had to do was keep quiet about it—keep it to himself. That's exactly what the guilds did in Europe and that's exactly why our Founding Fathers put this plan into the Constitution in the first place—to deter secrecy and the hiding of new ways to do things—and to get ideas out into the open. There are only two possibilities; an inventor either keeps his idea a secret or he discloses it. If upon disclosure, everybody is free to run in and grab it, as Galileo said centuries ago, the inventor will not disclose it in the first place. He would be a fool to do so.

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expiring patent is *only* on the improvement. Today's Polaroid camera is smaller, quicker, easier to operate, and *cheaper* than the one originally patented. So, unless you don't want improvements any more, you have to say that whether the corporation gets the improvement patent or an outsider does is totally irrelevant.

4. "Patent licenses which restrict the license are naughty things." Ridiculous! I give you a license to practice my invention, but I say you can practice it only in Chicago, or only on carpets and not on suits that I am making. People with an antitrust mind-set get all upset and excited and then get judges all concerned that it is a "restrictive" license. Of course, it is! But what everybody seems to forget is that the licensee started out *totally* restricted from practicing the invention anywhere or on anything. He couldn't use it on automobiles, he couldn't use it in Chicago, he couldn't use it on carpets or on anything else. There is an easy test to apply when you must decide whether a license is a good or a bad license—very simple. If the licensee is no more restricted after the license than he was before, it's a good license. If, after the license, the licensee is *more* restricted than he was before, it's a bad license. For example, I may say you can sell this patented microphone in Chicago, but you have to buy this rostrum, on which I have no patent, from me. You were never before restricted on where you bought your rostrums and now you are. That's a bad license because I tied it to an unpatented item. The fact that you can sell the microphone only in Chicago is not bad because you couldn't sell it anywhere before. So you test the license on whether or not the licensee is more restricted after the license than he was before. If he is, it's bad; if he isn't, it's good.

5. "There is conflict between the patent law and the antitrust law." Not so. This is currently a popular, widespread myth. As Josh Billings used to say, "The problem is not what folks don't know. It's what people know for darn sure that just ain't so." In the first place, the patent laws were around about a hundred years before we had any antitrust laws. In the second place, there is not more conflict between patent laws and antitrust laws than there is between real estate laws and antitrust laws—or money laws and antitrust laws—or any other laws and antitrust laws. As I indicated earlier, a patent can be used in an illegal agreement. Of course it can—so can money—so can real estate—so can stocks and bonds—so can almost any property be used in the course of or as part of an illegal agreement. But that doesn't mean there is a conflict between patent laws and antitrust laws; there is absolutely none whatsoever.

And, gentlemen, so that I may not be understood, the patent right, like all asserted rights, is subject to attack; it is subject to testing. The title to any property may be challenged. It is just as wrong, and just as bad for the patent system and the country for you to hold an invalid patent valid as it is to hold a valid patent invalid. Erroneous decisions in either direction are equally bad. The problem exists because courts reach the results they do for the wrong reasons; judges misstate and becloud the law of patents. That is the problem—not that so many patents are found valid or invalid. There are many statistical studies on how many patents are held valid and how many invalid. Such studies are totally irrelevant, in my view. Don't waste your time on them. For every one you show me, I can show you another statistical study coming out the opposite door. They are meaningless. The trouble lies in the language of the opinions and the approach taken to decision in patent cases—not whether the patent was held valid or invalid in any particular case.

Incidentally, if I had my way, courts would never hold a patent valid! Not because of any foolish "public policy" consideration and not because it's "hypothetical" when there is no infringement. But because no one can ever be totally sure. On the other hand, to ignore the issue is unfair to litigants and to the appellate court. Instead of finding a patent valid, I would require that the courts simply state, "the defendant in this case failed to carry his burden of proving the patent invalid." That you can be sure of. And that approach has the virtue of avoiding statistics and heartburn about "public policy."

Similarly, I would give short shrift to what I consider the overkill respecting the statutory presumption of validity. Like all presumptions, it is a *procedural* tool. It simply means, as the next (and redundant) sentence in the statute says, that the burden of proving invalidity rests on him who asserts it.

Now there *are* problems in the Patent Office, to which some courts have referred. No question about it. But the solution lies in providing more and better examiners, procedures, and administration in the Patent Office itself —not in the destruction of the system or in further obfuscation of the law.

Gentlemen, I have spent this much time on these points because a major part of today's difficulties in patent cases rests on misunderstanding, misstatements, and misapplication of the law appearing in numerous opinions and making the outcome of today's patent case far too much a matter of chance. This has led to confusion in the law—which in turn has caused rampant forum shopping and unnecessary sparring and foot-dragging by counsel, about which I'll say more in a moment.

So, as to you and the law, I have the following suggestions:

1. Read the statute: 35 U.S.C. You all handle cases in which there is no statute. But you've got one in patent cases. Read it! You don't have to read all 95 sections, but you should read the few key sections which apply to your case.

2. Regarding "obviousness," read *Graham* v. *John Deere,* 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459 (1966), and no others, as far as opinions go. I'll hear from a few circuit judges on that "no others" business, I suppose, but there are no other recent opinions I would recommend. I don't think you need any more. There are some others on particular issues, but to understand the law on obviousness, which is usually the biggest problem, you'll find *John Deere* is very helpful. One caveat—the opinion refers to "secondary" considerations such as commercial success, long-felt need, and so on, and says these facts may be indicia of nonobviousness and thus that the invention was patentable. But these considerations are not secondary in *importance;* they are secondary only in time, because they occurred or became relevant only after the invention was made. Just as you test many acts in

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simplify the issues, and simplify the exhibits. They can do it. They are often reluctant to do it. In your materials is a paper prepared by the lawyers as a guide for judges on preliminary pretrial orders in patent cases. There is much in it about plaintiff's lawyer supplying data to educate defendant's lawyer, and vice versa. But in all six pages there is not one word, anywhere, about anyone educating the judge or about simplifying anything. The paper twice recommends that you *not* set a date for completion of discovery. If I were in your shoes, I would set one, at least in most cases. You can always extend it, *if* there's a real reason.

And now to the second special problem in patent cases, the lawyers. Patent lawyers have some very good points. They do submit meticulous, pretrial orders, and briefs. They won't often hide authorities that are against them. They are professional. They are gentlemen. Their word is good. They prepare very conscientiously and very thoroughly. Therein lies the rub—many prepare too thoroughly. The judges I heard from say that patent lawyers overprove and overtry. They will prove the world is round four or five times if permitted to do so. The major complaint of the many judges who responded to my inquiry was that most patent lawyers abuse the pretrial and posttrial procedures. You will note, as we go along, that much of what patent lawyers do, that you don't like, can be laid back at the judges' doorstep.

There are a number of things to know about patent lawyers. In the first place, there aren't many of them. There are only about 4,000 members of the American Patent Law Association and only a small percentage of them ever get to court. They are primarily of two types: the patent trial specialist, who rarely prosecutes patent applications; and the trial neophyte, who normally practices in the Patent Office and once in a while becomes involved in a lawsuit.

That means one big problem: you will find settlement difficult. Some of the judges told me that patent lawyers lag all others in their efforts toward and ideas for settlement. They are less willing to counsel their clients toward settlement; they are less intense and less imaginative in working up a settlement mechanism. We can't know all the reasons for this, of course. Perhaps the specialist is a boxer, trained to fight—not settle. The neophyte may have already counseled his client: "This is a good patent, go ahead and sue on it," or "You don't infringe the patent, go ahead and make the invention," or "You do infringe, but don't worry because the judge will say the patent is invalid." Having taken a position, it is very hard for the lawyer to say, "Hey, let's settle this." Those are things you have to watch for in working toward settlement.

Another big problem is created by shotgun pleadings. The plaintiff is reluctant to state at the outset the true invention or how it works because in some cases he doesn't know precisely. If time permitted, I could get into why that's so and why it is not necessarily bad. Nonetheless, he is reluctant to state, early on and in detail, what the invention really is. On the other side, there are some 20 defenses to a patent infringement suit. And every defense lawyer seems to list all possible defenses in every answer. He's got them in a drawer. I know; I was there. And all he does is change the title and file it. And every answer today incorporates fraud and antitrust counterclaims, of course. Now many of those same defenses, gentlemen, if you don't do anything about it, will still be in the pleadings at the end of trial and there will not have been an ounce of evidence about them. You may have needlessly prepared to hear evidence on defenses that never really existed. The same phenomenon may occur respecting exhibits, if you permit it. Some defendants will throw everything at the ceiling, hoping something will stick. In the extended rubber litigation, defendants offered 144 prior patents. The courts of South Africa, in the same case, made the parties boil them down to 12. Shotgun pleadings lead to a massive logistics problem and the job of managing it.

A common problem resides in the number and type of experts. Your manual on Complex and Multi-District Litigation, appendix 3.51, refers to experts generally. One of the things you should do in patent cases, is to determine at the outset the kind of experts you are going to be faced with. There are two kinds, technical and legal. Technical experts are also of two kinds—the practical, i.e., the man who has had years of working in the field (which I would prefer) and the theoretical, i.e., the academician, the professor. The legal expert is often a patent attorney. The legal expert may try to tell the judge how to interpret the claim, which may be the real gut issue of the case. Many judges have forbidden that. Judge Campbell had a practice I would strongly recommend. Normally, if you don't do anything about it, counsel will put his expert on the stand. He will then stand there with a big loose-leaf notebook, with pages upon pages of questions, all of which he has drilled the expert on, and he will read each question. The expert will give the prepared answer, and then the lawyer will read the next one. Judge Campbell permitted no direct examination of the expert. His expertise being stipulated, the expert merely sat down and told his story on his own. Then, of course, he was subjected to cross-examination.

Now, what cures might be suggested for the problems of foot-dragging and over-use of pretrial procedures? As I said a moment ago, take charge early; make them educate you and make them simplify. In the omnibus pretrial, make them separate the issues and if at all possible, separate the defenses. You can certainly separate the purely legal and the factual defenses. You can then separate the fact defenses between those based on simple fact and those based on complex fact. Do what you can to limit the defenses. Defense counsel says, "I have a prior public use. I know they sold it more than a year before they filed the application." If that's proven, the statute makes it the end of the ball game. I realize the problem of piecemeal litigation, but if he really believes in that defense and can step up and prove it, you might consider giving him a chance. If he does, that's the end of the trial. If he doesn't, of course, he may have another defense. But it may be worth a try in some cases.

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At the trial, it is rare to have a jury in a patent case. Many judges have said, "Patent lawyers are much too gentlemanly; they don't object often enough to improper evidence." But when they do, the *judges* have historically said, "Well, there's no jury here, gentlemen, I'll take it for what it's worth." Have you ever said that? I've heard it many times. And for that reason, of course, many lawyers say, "Why object? He is going to let it in anyway." So don't say it. You are going to have to struggle later with all you let in. Why not tell counsel at pretrial to object at trial when they think it appropriate and then rule? If there is still no objection, you might jump in and say, "Now why is that relevant?" "How is that admissible?" and so on.

Perhaps one of the biggest special problems with patent cases is in making the decision after trial. Normally you begin a patent trial right after another trial. At that point, you have not read all the pretrial briefs, exhibits, depositions, and other material. When you have concluded the patent trial, you still haven't read all that material. So you can't decide the case. And you go on immediately to the next trial. The lawyers (and they are used to this) prepare and file posttrial briefs and proposed findings, which are submitted to you months later. Now, months after that, you still can't interrupt other matters to decide the patent case.

Finally, gentlemen, you bite the bullet. You must then read all the material. Finally. And you must reread what you heard at trial, which is too bad. It's hard enough to organize all of this mass of technical evidence and these thousands of pages of transcript of testimony into intelligible findings when that material is fresh. It's almost impossible to do so after it has grown cold. Technology learned has been forgotten. It's terribly difficult to re-capture the freshness of perception you had at trial. It takes sustained, uninterrupted effort, and, gentlemen, that means *time*. Again, that precious and finite commodity. And you run the risk of deciding the case on a basis not covered at the trial.

As a never-uncertain Irishman, I recommend a three-step cure:

1. *Dictate your trial impressions daily.* Immediately on adjournment each day, dictate, on a stream-of-consciousness basis, your findings, feelings, impressions, thoughts on the law, questions. If I were doing it, I would put it on this little tape recorder I carry everywhere I go. But as soon as you get back in chambers, dictate—just off the top of your head—everything you can think of from your notes or whatever about the case. It's hard with all the other things you have on your desk, I know, and it takes discipline. But, gentlemen, the resulting memos can be the best refresher device, even though you may have had to change some impressions in view of later evidence as the trail progressed. Just listening to that tape or if you have it transcribed, just running through it, your impressions taken from the trial can be the best possible refresher when you come to deciding the case.

2. *Substitute closing oral argument for posttrial briefs.* Of course, you have to tell the lawyers at the pretrial conference, so they'll plan for it. Otherwise, they will expect to submit posttrial briefs and proposed findings. It will not be difficult for counsel to make a closing argument at the end of trial. If he knows he is going to have to do so, counsel has plenty of time to prepare. Occasionally, counsel may need an hour or two after trial to polish his argument.

3. *Decide from the bench.* You are never going to be in a better position to decide the case, than you are at the end of trial. But the key to success, gentlemen, the key to success is to read everything before the trial. Even if you must delay the trial a day or two to do it. It will pay dividends in the long run. Even if you have to say, "Gentlemen, we will start this trial on Wednesday instead of Monday, because I need 2 days to read all this stuff." Now, of course, you will tell the lawyers at the first pretrial that you intend to decide from the bench. Counsel will understand, then, when you ask them to identify, right from the beginning and specifically, all the items which they want you to read—what portions of which depositions, what portions of which exhibits, and so on. Then read that material, hear the evidence, hear the closing arguments, and decide from the bench.

Then, where your circuits will let you, you can let the winner supply findings and conclusions and the loser supply objections. If your circuit doesn't permit that, your law clerk, of course, can get busy on it. In either case, the decision has been made. You can go on to the next trial with a lovely feeling of relaxation. Even in the unlikely event that at the end of the trial a particular case is still so horribly complex that you can't decide, it is very likely that you will be able to decide it in a few days if you have followed these steps.

Finally, gentlemen, when it comes to handling special problems in patent cases, as in all cases, I know that there is a desire that has haunted your days and dreams ever since you put that robe on. I know it has mine. And that desire is that we decide every case correctly—that we do justice in every case. And maybe the answer to that special problem lies in our reliance on a Supreme Being much wiser than any of us.

APPENDIX F

Executive Summary

A Proven Mechanism for Stimulating Innovation by Means of a Self-Sustaining Government-Owned Corporation

Modeled after the outstandingly successful National Research Development Corporation, NRDC, of the United Kingdom, a modest U.S. prototype operation has been established in Connecticut. It is the Connecticut Product Development Corporation, CPDC. This state-owned corporation provides risk capital for new product development. It does not take equity positions, but rather receives a levy (royalty) from successful innovations. In time, the royalty stream is expected to make CPDC self-sustaining, as has been the case of the NRDC in England.

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key steps in industrial research. Outstanding invention is preceded by the appropriate research, both pure and applied; particularly important is the need for pre-invention research to understand the needs of society. Invention must be followed by competent applications of research and engineering, safety and environmental testing, marketing, and raw material supply if a commercial benefit is going to accrue. This involves many scientists and engineers and nontechnical persons carrying out their part of the total process in full and open communication with the other participants. Only a very small percentage of the technical participants will be involved in legal invention and, hence, eligible for the award scheme. Typically, of all the "inventions" for which patents are granted, only a few will have great commercial significance. Further, such significance will only appear years after the invention and following great investment and much creative work by others of the industrial research and commercialization team.

Singling out "inventions" from all the other activities in industrial research for possibly large awards will:

1. Reduce the effectiveness and efficiency of industrial research by reducing communication between participants. Pure and applied research scientists will become more secretive in an attempt to make sure that they make the invention themselves. This will importantly reduce the probability of outstanding inventions occurring. Certainly, the increased secrecy will retard the overall progress of the industrial research effort to reach its goal.

2. Make it more difficult to ensure that objectivity is maintained in the evaluation of inventions. Inventors will have a monetary interest in pressing their own inventions. This interest may prevail to the prejudice of scientific objectivity in the evaluation of the economic, safety, and environmental implications of an invention.

3. Lead to distortions in technical work programs to the detriment of industrial research, reducing its overall effectiveness. If invention is seen as where the major rewards are, technically trained people will be attracted to choices offering opportunity to "invent." They will be inclined to forsake other areas of technical work such as basic research, safety testing, analytical, and engineering which offer lesser prospects for awards. There is no reason to believe that invention is the limiting factor in industrial research.

4. Undermine the sponsorship of industrial research and the commercial investment necessary to bring inventions to the marketplace. The reduced efficiency of the research and development organizations will increase their costs which, in turn, will mean that fewer research and development projects will be undertaken. The more marginal will be avoided for simple economic reasons. When "inventions" do occur, new uncertainty will be added to the many surrounding the commercial decision whether to invest in the invention to bring it to the marketplace. This new uncertainty is the chance of the enterprise being required to make large payments to the inventor. With this added risk, the number of new products reaching the market will be reduced. Both of these effects will tend to reduce employment of the nation's technological and other productive resources and retard its progress.

In net, the only people to benefit from this proposal are the few individuals who receive awards. Everybody else, from society in general through the slowing down of the industrial research process to the other scientists and engineers through the reduced effectiveness of their efforts, will suffer. The proposal would introduce a completely untried scheme into the heart of the industrial research program with no showing that real benefits will result. While employee inventors should be given every encouragement and recognition, it is doubtful whether in the context of industrial relations this is best done by the imposition of statutory obligations on the employer.

EMPLOYEE-EMPLOYER RELATIONSHIP

Those of us who are not inventors have oftentimes made the nonsensical remark such as "that a man with an inventive turn of mind will invent, no matter what." [1]

To counter the above Jack Rabinow once stated:

> "When I worked for the Bureau of Standards and calibrated water current meters, I invented nothing. . . . Then I was thrown into war work . . . and my inventing shot up tremendously because I was given an environment where they wanted inventions.
>
> . . . I quit the Bureau of Standards and opened my own company and became a consultant. Suddenly the invention rate went up to some six times higher than it was at the Bureau of Standards. . . . I invented like mad. Then I sold some stock in my company, and the invention rate went to near zero because I was busy with Wall Street.
>
> It's not true that you invent 'anyway,' you invent when you are busy inventing and you don't invent when you are selling stock."[2]

The foregoing is submitted to clearly focus that it takes motivation to invent. It is within the purview of this abbreviated report to look at what avenues are open to provide that motivation.

Patent assignment data indicates that about 80 percent of all patents are in the names of inventors who are employed by others. It is important to note that nearly all of these individuals are required to preassign their patent rights to their employers as a condition of employment, and they derive little or no direct benefit from their patents. Most employers state that their engineers are "hired to invent." Though it is true that some engineers and scientists are specifically hired to invent and are paid high salaries, given elaborate laboratory facilities in which to function, and are recognized with bonuses and awards for their genius, most inventions do not emanate from this group. Engineers are usually hired to carry out specific tasks which include research, development, marketing, production, sales, etc. and most inventions are ancillary to the job. In the

Appendix G was submitted to the subcommittee by Mr. Richard C. Witte, Chief Patent Counsel, the Proctor-Gamble Company.

[1] The Public Need and the Role of the Inventor, Proceedings of a Conference held in Monterey, Calif. June 11–14, 1973, National Bureau of Standards Special Publication 388, p. 105.

[2] Ibid, supra n. 1, p. 116.

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1961	.....	48
1962	.....	35
1963 (first half)	.....	28 old policy
1963 (second half)	.....	93 new policy
1964	.....	188
1965	.....	187
1966	.....	220
1967	.....	187 as of Dec. 12, 1967"

This type of data is difficult to find, since the trend in the country is toward more restrictive policies rather than more liberal.

An inventor summed up the essence of the incentive system. In a statement reported in The Journal of the Patent, Trademark and Copyright Research Institute of George Washington University, Volume 7, Conference Number at p. 179, Richard R. Walton stated:

> I wish to state categorically that there is no great and successful industrial innovation that has not been accompanied by a very strong profit motive. The inventor is pushed from behind by the specter of want and failure, but he is pulled forward by the opportunity of large gains if successful. Actually, in speaking of motive, probably the nicest of them all is the profit motive.

The essence of this statement is the profit motive. In the current industrial enterprise system, where are the "large gains" for the employed inventor?

A drastic action to thwart the preassignment agreement would be to pass legislation that would make such an agreement an unfair labor practice act. In fact such a bill was introduced in 1963 by Congressman George Brown (D–Calif.) (H.R. 4932) which came to naught.

A milder and perhaps more salutary recommendation may be found in the type of legislation that Congressman John E. Moss (D–Calif.) has introduced into the House of Representatives in every Congress since 1970. The Moss bill was modeled after the West German Law for Employee Invention Rights which became law in 1957. An inquiry was made by the California Society of Professional Engineers to determine the reaction of an association of German engineers, Verein Deutscher Ingenieure, to the law. They stated:

> "According to the documented experience, the Law for Employee Invention Rights, of July 25, 1957, was well accepted by employees. Also, we are of the opinion that this law of the Federal Republic of Germany is one of the most modern regulations to be found in the world, as it equalizes in a responsible manner the divergent interests between the labor rights and the corporation rights."

The bill is a comprehensive approach to the problem which recognizes both the rights of the inventor and the innovator. It differentiates between an invention made in the course of employment and inventions that are the result of individual efforts external to the job environment and not related to the employer's business. To insure that disclosures reach the light of day (the constitutional purpose), it establishes specific periods of time for actions by the inventor and innovator. The thrust of this bill is to provide protection of the inventor's interest so as to increase the incentive for the inventor to disclose. The increased disclosure will certainly benefit the public with more patented inventions, and the employers can't help but benefit in the sale of these inventions, the sale of the products, and the royalties derived from licensing others to practice these inventions.

It can be concluded that the creative, technically inclined person is poorly if at all protected in his relationship with employers. His integrity is being compromised by the concentration of capital and its ultimate control of his only salable product, his ideas. If remedies are not developed for the individual we shall shortly observe the demise of small technological firms, a resulting loss of many ideas, the stagnation of economic competition and fruitful and varied development, and the further concentration of the means of production into the hands of a few would, perhaps, not maliciously but with similar results, dictate the economic status, rewards, and civil liberties of the vast majority who have become simply wage earners marking time for an impersonal employer.

Undoubtedly, many readers of the foregoing will take great exception to what has been proposed. I would remind those individuals that one of the reasons for this committee's very existence is due to our stumbling in achieving innovation in the face of Japanese and German competition *and* I would further remind those individuals that these two countries possess statutes of the type that I would now ask you to entertain.

Appendix G was submitted to the subcommittee by Eric P. Schellin, Esq., Vice Chairman, Board of Trustees, National Small Business Association, Washington, D.C. 20006.

Testimony U.S. Department of Commerce
Committee on Innovation
November 16, 1978
by
Richard L. Garwin
IBM Thomas J. Watson Research Center
P.O. Box 218
Yorktown Heights, N.Y. 10598
(914) 945-2555

Thank you for the opportunity of appearing before you and presenting my views, especially on the role of the inventor in this important problem of improving the rate and impact of innovation on the U.S. economy. I was invited to testify by one of your members, and I do so as an individual without attempting to represent the view of my principal employer—IBM—or any other group.

My brief biography is attached as the last page of this testimony, but I should summarize here that I have personally been granted 27 U.S. patents, most of them assigned to my principal employer, but several issued to me in other capacities. My most recent patent No. 4,097,115 was issued June 27, 1978, to me and James Levine, "Optical Scanning Device for Producing a Multiple Line Scan Using a Linear Array of Sources and a Textured Scanned Surface." In addition, I have invented many other useful devices or processes, some of which have been published in scientific and technical papers, some in the patent literature, and some abandoned for various reasons without proceeding through the patent process. These inventions range from those

... the course of employment and inventions that are the result of individual efforts external to the job environment and not related to the employer's business. To insure that disclosures reach the light of day (the constitutional purpose), it establishes specific periods of time for actions by the inventor and innovator. The thrust of this bill is to provide protection of the inventor's interest so as to increase the incentive for the inventor to disclose. The increased disclosure will certainly benefit the public with more patented inventions, to me in other capacities. My most recent patent No. 4,097,115 was issued June 27, 1978, to me and James Levine, "Optical Scanning Device for Producing a Multiple Line Scan Using a Linear Array of Sources and a Textured Scanned Surface." In addition, I have invented many other useful devices or processes, some of which have been published in scientific and technical papers, some in the patent literature, and some abandoned for various reasons without proceeding through the patent process. These inventions range from those

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The U.S. economy is also affected by the degree to which inventions are commercialized even if they are not in the mainline of business of a corporation. My own employment contract with IBM gives IBM title in my inventions which relate to the field of interest of the corporation, but I have made several inventions for which I have been granted formal releases by the corporation. There is also, however, the general question of inventions made within the field of interest of the employer but which are not patented or perhaps not commercialized by that employer, or which may be made jointly with independent inventors.

In thinking about this particular matter a decade ago, my thoughts ran about as follows:

Proposal for the Disposition of Inventions not Used by Company

Recent history is replete with inventions which have been rejected by many and yet when finally taken seriously have resulted in a great industry and a very valuable patent. One prize example is the Carlson patent for the Xerox process, which it is said was offered to 20 companies before a single taker was found. It is argued that inventions conceived by the employees of a large corporation, which normally are developed if they fit the taste, market, skills, and appetite of the particular corporation, have only a small probability of being brought to fruition, thereby discouraging invention by the employees, reducing the benefits to society of the research and development supported by a corporation, and eliminating the possible flow of royalties to the inventor or to the corporation which might result from a very successful invention brought to the marketplace by others.

These problems are probably exacerbated in a large corporation, in which small questions like individual marginal inventions receive little attention in competition with the large problems of the moment.

In outline form, this problem might be solved by allowing the employee-inventor to offer his invention (patent-applied-for or not) first to the company product divisions, next to company patent development, and finally, if company has taken no constructive action within a reasonable period to realize the invention, to outside firms or individuals who would receive exclusive licenses from company. In this role as an entrepreneur, the employee would be acting as an individual and not as an agent of company. Any royalty which might be agreed between the employee and the outsider would be paid to the employee, probably with some fraction of the employee's receipts going to company (this fraction might lie between 10 percent and 50 percent, and should be determined by further analysis).

Many points need to be clarified in this concept, before a good analysis can be made. Some of the clarification can be made by assumption, some will be left for iteration. For example, what does it mean to offer an invention to company—is an invention disclosure enough? Is the inventor's division responsible for attempting to evaluate the invention for its own use and to sell it to other divisions? What is a reasonable time? Six months? Twelve months?

After specifying these details, the worth of this proposal rests:

1. on the degree to which invention will be stimulated among the employees,
2. on the impartiality with which the employee offers the invention to company and then to the outside firm, when he receives a cash royalty only from the outside firm,
3. on the statement of reasonable rules governing the sale of inventions to competitors of company, and
4. on the amount of royalty income which it is anticipated these inventions might bring.

Clearly, the interaction of the company employee with the outside firm is a delicate matter, and it might be constrained to be by correspondence, a copy of which would be deposited with company patent development.

There may be precedence for this proposal in the policy which has long been in effect for employees of U.S. Naval Laboratories, although it probably differs in detail.

As a matter of some relevance, one might review a recent proposal (Annual Report on Government Patent Policy, June 1966, Federal Council for Science and Technology) governing the transfer of patent rights to employee inventors.

In this field it is much easier to identify problems than to prescribe workable solutions, but I think that we also serve who from our experience responsibly point to such difficulties. One problem which I am sure has already been brought to the attention of this group is that concerned with mandatory nonexclusive licensing of patents.

In general, where the U.S. Government owns title to a patent, it will license it on a nonexclusive basis to all comers. This means that an individual or organization might invest great resources in the somewhat risky process of full development and marketing of a product based on an invention, only to find its commercial success shared or taken from it by a competitor who can move into the field later, taking a license on that same patent after all the risks have been removed. Of course, if the original entrant can move sufficiently fast, obtaining additional patent protection and the like, then it can keep its advantage, but otherwise because of a quirk in the law or of a policy decision, there may be none willing to take the risk of being the first in the field.

To some extent, cross-licensing agreements among commercial firms may have a similar effect on retarding introduction of innovation in the marketplace. For example, if an alert company MNO sees in the patent portfolio of company QRST an invention which QRST is not exploiting but which could make a profitable business, company MNO may take a license from QRST at, one hopes, reasonable terms. But if MNO makes a commercial success of this product, cross-licensees of QRST (some of whom may already be in the business of MNO) can move into the field without the development and market risk assumed by MNO. Thus, MNO is reluctant to innovate, and society loses.

There are no easy solutions, but I ask that the benefits and costs of different elements of the patent law

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There are no easy solutions, but I ask that the benefits and costs of different elements of the patent law

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patents or publications which may have a bearing on patentability and to request a reexamination. If such person has been named as a defendant in an infringement suit, the proposed legislation provides for a stay of the court proceeding to permit Patent Office review.

We have undertaken to evaluate these various approaches in the context of competitive considerations. In so doing, we recognize the paramount principle that any law or system which tends to stifle the incentive of the independent inventor to do research and make inventions would not be in the public interest. Many of the fundamental inventions which have been made in the past were the result of an independent inventor's effort. At the same time, we also recognize the great disparity in resources between the independent inventor or small business concern and the large corporation; and that it is in the public interest to insure that the latter does not get an undue and unfair advantage vis-a-vis the former. It is acknowledged by all that patent infringement litigation is expensive and time consuming. A patent, whether valid or invalid, can be a devastating anticompetitive weapon in the hands of an aggressive company. In our evaluation we have kept these considerations in mind, and have concluded that the competitive objective, and the desire to assist independent inventors and small businesses and not impose undue burdens on them, would be better served by the postissuance reexamination procedures of S. 214 than by the preissuance or postissuance inter partes opposition procedures of S. 1308 and S. 23. Some of our reasons for this conclusion are set forth below.

II

A. We believe, first, that both preissuance and postissuance inter partes opposition procedures can be used as a device to maintain market entrenchment and frustrate potential competition. These procedures, which in effect invite and encourage opposition under the umbrella of a Federal statute, have a built-in potential for abuse by those who desire to delay the issuance or enforceability of a patent, or who may believe their market position would be affected by the existence of the patent. Utilization of the procedures with this intent is, of course, anticompetitive and would be extremely difficult to establish. Moreover, since it would be done within a statutory framework, the strictures of the *Noerr-Pennington* doctrine becloud the extent to which the Department of Justice could take action. This possibility for abuse was recognized we believe, by Mr. Kauper, the Assistant Attorney General in charge of the Antitrust Division, when he testified before the Senate Judiciary Subcommittee in September 1973. He stated:

> A second reason for limiting somewhat the direct participation of the public in the examining process is the concern that in some cases such rights may be abused, particularly by one or more financially powerful and entrenched firms to forestall the issuance to a newcomer of a patent which threatens an established market structure or position. Any opposition proceeding can be misused in this way, and antitrust enforcement officials will have to be particularly vigilant to see that such abuse, insofar as it can be curbed by the rules articulated in such cases as *California Motor Transport* and *Otter Tail* does not occur. But the simple fact is that the longer a competitor has to oppose the application—in S. 1321 virtually from the date it is filed—the greater his opportunity for unjust harassment. Again, it seems to us that the best course is to strike a balance, and that is what the administraiton proposal for opposition proceedings seeks to do.

We question the advisability of adopting a procedure when there is foreknowledge that it is capable of being abused, as described above, for anticompetitive purposes. This is particularly true if there is available an alternative procedure that does not have this infirmity, but which at the same time, would improve the quality of the patent system. The alternative is the postissuance reexamination provision of S. 214; the Commissioner of Patents, in a recent letter to Senator Fong acknowledged that the provisions of that bill would also "improve the ultimate validity of patents."

B. Next, even absent an anticompetitive intent, both the preissuance and postissuance inter partes procedures provide an opportunity to delay the issuance and enforceability of patents. The potentiality for delay and harassment inherent in such inter partes procedures was recognized and emphasized by a number of knowledgeable witnesses who testified before the Senate Subcommittee. Some of the witnesses spoke from the benefit of their own personal experiences with respect to similar procedures in foreign countries; others had made a study of those procedures, and found them susceptible to delaying tactics. This would, of course, have particular impact on independent inventors and small business concerns who would be faced with delay and substantial expense before they even know whether their patent would have any commercial utility. It was pointed out that experience in other countries indicates that opposition proceedings are sometimes misused to "tieup and delay" enforcement proceedings by a patentee. Moreover, a representative of the American Bar Association emphasized the disadvantage to small versus large companies; and many other witnesses commented on delay, citing foreign experience. These delays, we believe, will have particular impact on those who cannot afford to suffer them. Inter partes procedures provide many of the same delaying and harassment opportunities available in full-fledged infringement actions. These opportunities are frequently present at the discovery stage: inter partes oppositions also provide for discovery and it is reasonable to assume similar opportunities will be present.

C. We also believe that preissuance and inter partes procedures are likely to impose severe financial burdens on independent inventors and small business concerns. It is quite probable that opposition procedures will be utilized principally by larger corporations who have the financial capability and the in-house patent staffs to proceed quickly and without financial hardship. The burden would be quite different on an independent inventor or a small business concern which must retain patent Counsel either to defend an opposition or to start one.

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citation at any time during the life of the patent would enhance the likelihood that more and better prior art will be forthcoming. As a practical matter under pre-issuance and inter partes opposition procedures, the only way later discovered prior art can be utilized by an alleged infringer is in a patent infringement suit. Postissuance examination, in the other hand, would permit the assertion to the Patent Office *at any time during the life of the patent* of newly discovered prior art.

Of significance, also, is the fact that foreign prior art is relevant, and even large companies would frequently not have this available during opposition proceedings. Certainly, smaller companies and independent inventors are not likely to have it. Under postissuance reexamination which would permit prior art to be cited at any time during the life of the patent, small concerns would have time to search foreign art, particularly if the passage of time demonstrated that there was a financial advantage for them to do.

Finally, the opportunity to develop and present meaningful and complete prior art could be of great benefit to the patentee himself who, under postissuance reexamination procedures, could also cite prior art to the Patent Office with the possible objective of narrowing or otherwise adjusting his claims. Such art might come to his attention, for example, during his search in foreign countries in connection with his filing of foreign counterpart patents.

III

While the subject of "Courts vs. Patent Office" is somewhat removed from the main subject matter of this memorandum, we wish to offer the comment that the provisions in S. 214 that would limit a court to the consideration of prior art only after a ruling by the Patent Office on the relevance of such prior art should not be asserted to defeat the laudable and procompetitive features of the postissuance reexamination procedures. It might be noted that courts would probably welcome the aid of the technical expertise of the Patent Office on highly technical issues. This, of course, is not a new and startling thought. Judge Learned Hand expressed it many years ago in *Reiner* v. *I. Leon Co.*, 285 F(2) 501 (2nd Cir. 1960). This was a patent infringement action re: clamps used to maintain curls in a woman's hair. This sounds simple enough; but on page 504 of the opinion, Judge Hand reflected on the inherent intricacies of determining the validity of a technical novelty when he said:

> To judge on our own that this or that new assemblage of old factors was, or was not, 'obvious' is to substitute our own ignorance for the acquaintance with the subject matter of those who are familiar with it.

This case has been extensively cited. As late as November of 1974, the defendant in a declaratory judgment action alleging invalidity of a patent for a split-back shipping envelope, quoted Judge Hand's above statement—and District Court Judge Stern of New Jersey felt appropriately so. *Adm. Corp.* v. *Speedmaster Packaging Corp.* 384 F.S. 1325, 1344 (1974).

This was not the first time Judge Hand had expressed concern over the court's difficulty in dealing with highly complex patent cases. In another case (also cited extensively) this time an infringement action re: a medicinal substance called "Adrenalin" which is extracted from the suprarenal glands of living animals, (and while still a District Judge) he ended the decision with the following passage:

> I cannot stop without calling attention to the extraordinary condition of the law which makes it possible for a man without any knowledge of even the rudiments of chemistry to pass upon such questions as these. The inordinate expense of time is the least of the resulting evils, for only a trained chemist is really capable of passing upon such facts. . . . In Germany, . . . the court summons technical judges to whom technical questions are submitted and who can intelligently pass upon the issues without blindly groping among testimony upon matters wholly out of their ken. How long shall we continue to blunder along without the aid of unpartisan and authoritative scientific assistance in the administration of justice, no one knows; but all fair persons not conventionalized by provincial legal habits of mind ought, I should think unite to effect some such advance. *Parke-Davis Co.* v. *H. K. Mulford Co.* 189 F. 95, 115 (C.C.S.D.N.Y. 1911).

There have been, of course, many similar expressions by other courts. We do not wish to belabor this point, but as we indicated above, (and since courts have indicated they need assistance on technical questions), we do not believe any fears of "court usurpation" should operate against the adoption of postissuance reexamination procedures. If, by virtue of limited technical assistance rendered to the courts by the Patent Office, the patent system will be improved, this benefits the economy and competition. Indeed, inter partes opposition proceedings, with the rights of discovery afforded thereunder, could conceivably result in a greater infringement on court prerogatives than would the postissuance reexamination procedures. Moreover, even under the latter procedures, the court would ultimately be the final arbiter.

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comment

OF THE PUBLIC INTEREST SUBCOMMITTEE ON PATENT POLICY

industrial innovation

industrial innovation

Comment of the Public Interest Subcommittee on the Industry Report on Patent Policy

The Industry report proceeded from the assumption that the patent system is working well and needs only minor tinkering to work even better. The report of the Public Interest Subcommittee identified several areas of substantial problems with patents, which go deeper than mere tinkering could solve. One of the foremost problems is the decrease in the value of patents to individuals because of the need for massive resources to enforce the patent through the courts once it has been granted. What we have today is patent protection for the rich, clothed in the guise of the sacrosanct protection of Eli Whitney and Robert Fulton and Alexander Graham Bell. The inequality of power and resources in patent disputes threatens to make a mockery of the entire patent system unless thorough review and reform takes place in the near future.

ENHANCING RELIABILITY AND REDUCING COST

The Public Interest Subcommittee supports the first two goals put forth by the Industry Subcommittee—enhancing the reliability of the patent grant and reducing the cost of judicial enforcement. Their recommended means, however, do not seem to be sufficient to reach those goals.

To enhance reliability, the Industry Subcommittee recommended a reexamination process. They propose that the patent office reexamine a patent if requested by an interested party when additional art is found after the patent has been issued. From the description in the industry report, we find that this is intended as an ancillary procedure, prior to or parallel to litigation. They view it as primarily aimed at influencing the outcome of litigation and thus it seems probable, if not certain, that such a reexamination procedure would increase rather than decrease costs. It seems to be primarily a scheme to provide additional employment for patent attorneys.

Nor is their proposal to reduce the cost of patent litigation any more likely to be effective. To reduce costs, which the Public Interest Subcommittee sees as the most critical problem with patents, the Industry Subcommittee recommends that judges become more efficient. After duly noting that costs is a serious problem for the individual inventor and small company, "because they can neither spend the time nor the substantial expense, which frequently exceeds $250,000 per party in a patent infringement suit," they refer the reader to the recommendations in a speech of Judge Howard T. Markey, which they reprint. Judge Markey's speech is entertaining, but even if his exhortations to his colleagues to be more efficient were scrupulously followed, such changes deal on the extreme margin of the problem. They do not begin to speak to the tremendous gulf between $250,000 and an individual inventor or small company. Even one-half the cost or one-tenth the cost—$125,000 or $25,000—might still be beyond their means, yet no judicial efficiency is going to accomplish such cost savings.

There were no patent experts serving on the Public Interest Subcommittee. While we can identify shortcomings in the proposals put forth by industry, we were not able to arrive at a complete blueprint for patent reform. Such reform must come after a thorough review in which a wide variety of viewpoints and expertise is tapped for recommendation and then evaluated. We urge initiation of such a review. For the moment, however, we offer a few ideas and priorities for discussion on the direction patent reform should take.

First, the patent office should have a program to assist individual inventors and very small business persons in applying for and obtaining patents.

Second, the disclosure of all material information could be improved by the replacing of the ex parte, the reliance solely on written submission, method of patent application with what has come to be considered a conventional administrative agency approach. Such an approach could include public advocacy proceedings and require patent briefs, to induce disclosure of the invention in specification. Such a procedure need not be followed in all cases if the patent office could identify classes of patents most likely to be litigated. An analysis should be conducted comparing the increased costs of this type of initial investigation with the costs of later challenge and litigation, including the cost of problems caused by uncertainty.

Third, an office should be created within the patent office to represent the public interest and assure the expeditious issuance of valid patents, prompt rejection of others, and the overall compliance with patent provisions.

Fourth, do away with explicit production goals for patent examiners, which still stress quantity rather than quality of patents.

Fifth, consideration should be given to making the Patent Office an independent agency, similar to the

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lobby is strong and fierce for the status quo. There would be healthy public debate if there was strong, organized public interest against this pressure.

Unfortunately that is not the case. Instead, we have only the general interest shared by all citizens that their Government not make a bad bargain for them in selling the stock of limited patent monopolies. It is our hope that this report and recommendation to the President contributes to the organization of such a public interest.

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INDUSTRIAL ADVISORY SUBCOMMITTEE REPORT ON DIRECT FEDERAL SUPPORT OF RESEARCH AND DEVELOPMENT

industrial innovation

Final Report
on
Direct Federal Support of Research and Development

A Report of the Advisory Subcommittee on Procurement and Direct Support of Research and Development of the Advisory Committee on Industrial Innovation established as part of the Domestic Policy Review.

February 15, 1979

Notice: This report represents the views of the Subcommittee on Procurement and Direct Federal Support of Research and Development of the Advisory Committee on Industrial Innovation, an advisory committee convened by and reporting to the Secretary of Commerce. The views of the Subcommittee do not necessarily represent those of the Department of Commerce or any other agency of the Federal Government.

FOREWORD

A domestic policy review of industrial innovation is being conducted as a result of President Carter's concern for the status of industrial innovation in the United States. This review is being directed by the Industrial Innovation Coordinating Committee, chaired by Secretary of Commerce Juanita M. Kreps.

An Advisory Committee on Industrial Innovation has been established that will bring to bear the views of business and industry, organized labor, the public interest, and the academic community expert on the subject. The subcommittees created under this Advisory Committee are examining a wide array of Federal programs and policies that impact upon industrial innovation.

This Report on Direct Federal Support of Research and Development was prepared by the Advisory Subcommittee on Procurement and Direct Support of Research and Development under the chairmanship of Dr. Jack E. Goldman, Group Vice President and Chief Scientist of the Xerox Corporation. The subcommittee, composed of representatives of the business and industrial community, has focused on Procurement and Direct Support of Research and Development issues and their impact on industrial innovation.

Following is the membership of the Subcommittee on Procurement and Direct Support of Research and Development.

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Report of Industrial Advisory Subcommittee on Direct Federal Support of Research & Development

J. E. Goldman—*Chairman*

INTRODUCTION

This report represents the conclusions of the panel on Direct Federal Support of Research and Development to stimulate innovation. The panel did not attempt to deal in-depth with the relationship between R. & D. and Innovation. Many earlier studies have covered this subject and in the final analysis it is not an established causal relationship between R. & D. and innovation that motivates consideration of the subject, but a recognition that within the universe, the state and the firm, there is a correlation between the rate of innovation and the total R. & D. effort. Our concern with direct Federal support of R. & D. is then primarily one of determining whether there are actions which the Federal Government can take that involve R. & D. line items in the budget which can influence the innovation rate.

The Federal R. & D. budget is a large agglomeration of line items in the budgets of a large number of government departments and agencies intended to serve a wide variety of purposes and constituencies. It touches all disciplines, a variety of social and national needs, and deploys all the institutional mechanisms to carry out the R. & D. demands. The magnitude of the national expenditure has been of less concern to the panel than the way in which the nation's R. & D. effort catalyzes innovation as distinct from discovery, invention, or application of known methods. In this respect, the panel believes that while the knowledge-base that government supported R. & D. (particularly R.) enables is being continuously expanded, there may be distortions in directions toward which the knowledge is focused and perhaps an imbalance in the institutional support where the knowledge is created. The essential problem, therefore, is one of coupling the knowledge base to the needs and opportunities for technological innovation.

The panel identified five sectors from which one could expect a disproportionately accelerated rate of innovation provided that institutionalized mechanisms are created to provide the essential coupling between the generation of R. & D. and its utilization in new products, processes, or test methods. These sections are respectively: The university environment, the national laboratories, small venture businesses and trade associations, and increased encouragement and support of unsolicited proposals from all segments of industry. We consider why each such sector lends itself to a boost in innovative capacity and propose budgetary and institutional mechanisms to effect this. As an addendum, we considered the problem of managing this from the Government's point of view and while we make no recommendations for major change in the Government's method of budgeting and managing its R. & D. resources, we call attention to the ONR experience which the panel believes is the Government's most successful experience in managing Research and stimulating innovation and to the NCA experience which is probably the Government's most successful experience of cooperation with industry in Research and Development.

I. UNIVERSITY-INDUSTRY RELATIONS

University research is a $4 billion resource and represents a significant fraction of the total Research and Development commitment of the United States and the major portion of the Research part of it. Seventy percent of university research is funded by the Federal Government but only 3 percent by the industrial community compared to 55 percent and 7.5 percent respectively in 1953. The panel senses that there has been an ever-widening gap between the university and industrial communities and, as a result, this key national source of new technical knowledge is not being adequately tapped for its innovative potential by the private sector—the sector with a major responsibility for innovation in the United States. One of the factors evidencing this diminution of the influence of university research on innovation in the private sector is the paucity in today's environment of new innovative businesses such as populated the Route 128 and Palo Alto communities in the fifties and sixties. The growth and success of these enterprises was importantly influenced by the university communities in their respective geographical locations.

The panel therefore recommends that it should be a goal of Federal policy to support a substantial increase in the level of coupling of university research with the industrial community without compromising the fundamental tenet that university research be publishable and freely available.

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- To expand the technical exchange and understanding between people in universities and people in industry in areas beyond a specific project, through the personal interaction of those involved.
- To provide more balance and a broader base toward the industrial needs of the future both in education and technology.
- To involve minimal governmental overhead expense in the execution of this program.
- To assure results significant to industry, as no company would contribute their money and time to projects of no value. (Note: this does not mean that every project will result in an industrial product or process. Negative answers preventing going down unsuccessful paths are frequently just as important.)
- To permit individual project decisions to be made by those directly involved.
- To provide an increased base of university publications and patents of potential interest to many industries.
- To provide rapid response to proposals which will aid in the stability of university planning.

II. INCENTIVES FOR TECHNOLOGY-BASED VENTURES

There is a body of knowledge and experience supporting the hypothesis that smaller enterprises are disproportionately the source of technological innovations. It is not our purpose in this report to go into the reasons for this other than to postulate a greater propensity for risk taking on the part of small business. It is further postulated that the economic effects of inflation, cost of money, pay-back time, poor access to capital, weak market understanding, and inability to cope with escalating requirements of regulatory and other government or consumer initiated demands, have had negative impact on small business risk-taking to an even larger extent than the impact on large business. Whatever the reasons, the net result is explicit: innovation is down in general and small business contributions are down by an even greater percentage.

It is, therefore, appropriate to consider preferential incentives to small business that would restimulate its traditional inclination toward innovation. The weaknesses of smaller business are more glaring and need buttressing in a period of declining innovation. An ancillary consequence of some form of artificial stimulation of innovation is to challenge existing large effective firms already competent and resourceful in innovation techniques to respond to the emerging new product and process competitors. Rational analysis by the large firm of its loss in revenue and market share from standing pat will lead to its intensified commitment to proprietary innovation. This enhancement of large firm innovation on its own resources is a multiplier of the national benefits from direct Federal R. & D. support to small innovative enterprises. Existing large ineffective firms, unskilled in innovation techniques, will suffer market displacement as new products and less costly processes emerge with growing market leadership by the smaller innovator. Either the ineffective firms will learn to deploy their resources to innovate effectively or they will decline towards failure. Both outcomes are benefits to the U.S. economy from direct Federal R. & D. support.

The panel was unable to agree on a single mechanism appropriate to this narrow but reasonably well-defined constituency. However, there are a sufficient number of prototypical solutions that have been successful in other segments of the economy to warrant consideration for applicability to this sector.

1. A National Advisory Committee for Technology patterned after the original National Advisory Committee for Aeronautics that played such a dominant role in moving the U.S. civilian aeronautical capability from poor fifth among developed countries at the outbreak of World War I to primacy in the post-World War II era. The pattern then which can be considered relevant now is for a commission composed of appropriate senior representatives of government, academia, and industry which would be chartered to establish national goals, policy guidelines, and success criteria for technological innovation enhancement in the United States and either directly or through subcommittees undertake financial sponsorship of R. & D. either through grants or low-interest loans to qualifying small firms carrying such support through prototype, engineering model, and pilot plant stage on a cost-sharing basis with the company, perhaps, in return for nonvoting equity.

2. In order to avoid the creation of yet another large and excessively powerful bureaucracy, it is proposed that this type of activity be initiated on an industry by industry basis and evaluation processes set up to validate the viability of the concept before further expansion to additional industries. One cannot escape the reality that in a very specific industry—commercial aircraft—the concept has proved eminently successful in achieving all that is demanded from the innovation process: technological preeminence, a superior and profitable domestic industry, and a strongly favorable export position. It is worth a try in at least a few other industries.

3. Federal sponsorship of State programs not unlike the Agricultural Experimental Activities in the State land grant colleges.

III. SUPPORT OF R. & D. ON GENERIC TECHNOLOGY

1. Direct Federal support, together with industry, of research, development, and dissemination to U.S. industry of new technology, generic to process or product innovation in wide spectra of industries, should be strengthened and recognized as Federal policy. The mechanism for accomplishing this should have the following features:

a. Development of a coordinated network of Cooperative Technology Centers (centers of excellence) in various fields of generic technology, distributed throughout the U.S. system of universities and colleges.

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about, first, because significant support of research in a given field in universities automatically attracts the most capable faculty to that field, who in turn attract more and better students to that field of study. Secondly, the fact that the research and development being supported must have direct relevance to promoting innovation of advanced technology in industry (i.e., be focused on real industrial problems and needs) means that students in that field of study, by virtue of that orientation of their faculty, will receive an education more tuned to the real needs and problems of industry.

3. The provision of neutral ground for government, university, industry cooperation. Government, university, and industry can work together most effectively and freely if all three are on neutral ground. Fortunately, a highly capable and knowledgeable neutral ground is ready made—the professional technical society. This mechanism is used very effectively in other countries, such as Japan, for just this purpose. Working groups made up of appropriate representatives from industry, universities, and government provide specific planning and policy-type guidance of each significant area of university research and development of generic technology to be undertaken, as well as of the transfer of the results of that to industry.

A case history demonstrating the major facilitation of innovation in industry which can come about when a university center of excellence, government, and industry are coupled is found in the origination of the generic technology of numerical control of machine tools—a technology which resulted in cost reduction in the metalworking machining operation of better than two to one, compared to conventional machines. The history of this cooperative innovation is described in the paper "Crucial Decisions during the Evolution of Numerical Control" by Professor J. Frances Reintjes of M.I.T., presented at the 1977 Annual Meeting of the Society for the History of Technology.

The rationale for the selection of the generic technology of manufacturing technology, and in particular of the still-incipient technology of computer integrated manufacturing, as a particularly appropriate initial activity for this program derives from factual information developed by the Society of Manufacturing Engineers. This is presented in their 1978 Position Paper titled "The National Role and Importance of Manufacturing Engineering and Advanced Manufacturing Technology." This paper points out the fact that manufacturing constitutes over two-thirds of the total wealth-producing activity in the United States.

Thus, reduction in the cost of manufacturing, as the major wealth-producing activity of this country, can have a major salutary effect on the economic health and well-being of the Nation, as well as on its competitiveness in world markets. Further, since the generation and supports of new jobs in the economy arises primarily from reduction of the cost of wealth production, reduction of the cost of manufacturing can also be powerfully beneficial toward attainment and maintenance of full employment in the economy.

By far the most potent agent for reduction of the cost of manufacturing is new or improved manufacturing technology. Such new or improved technology derives directly and primarily from manufacturing research and development. Thus, support of research and development of advanced manufacturing technology by a nation has maximum potential for economic and social benefit to that nation.

The particular area of manufacturing technology being recognized worldwide as having by far the greatest potential for reduction of the cost of manufacturing (and thus being most actively pursued by many industrialized nations today in their national programs of R. & D. and industrial implementation of generic technology) is the still incipient generic technology of computer integrated manufacturing—harnessing the computer to optimize and automate manufacturing fully from product design through final inspection. However, realization of this potential requires careful integrated planning, policy-type guidance and stimulation of research, development and assistance to industry in its utilization, such as offered by the Cooperative Technology Centers program—a fact well-recognized in the programs of a number of other nations.

Appendix: Quality and Technique in Support and Funding of R. & D.

1. *Unsolicited Proposals:* Experience over the post-war years has taught that innovative ideas are very often generated randomly in time and space and are not necessarily responsive to specific demands or fashions of support agencies. The degree to which Federal institutions that support R. & D. encourage and entertain unsolicited proposals correlates with the quality and innovativeness of the R. & D. community. The diminution of such support on the part of these institutions has not been supportive of the state of health of the innovative capacity of the country. The panel recommends that agencies be encouraged to award R. & D. funds for qualifying unsolicited proposals and that submission of such proposals be encouraged.

2. ONR As A Successful Example of Appropriate R. & D. Support: The panel—as did its sister panel on procurement—was very much impressed by the support and execution philosophy of ONR of the forties and fifties which led to major scientific advances in physics and chemistry "fueling much of the innovation which the country accomplished in that period and training many of today's technical leaders."

We quote from the report of Panel on Procurement: "That intelligent ONR program was replaced by a program of grants sponsored by the National Science Foundation (NSF) and various other government laboratories which have not been nearly as effective as was ONR in supporting academic research.

The ONR grants were aimed at supporting basic academic research in reputable universities and were not justified on any other grounds. NSF, NIH (National Institute for Health), and other such grants, while still *aimed* at basic research, must be justified in terms of relevancy to specific identifiable problems, such as cancer cures and the like. This centralization of technical decisionmaking is inimical to innovation and

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OF THE PUBLIC INTEREST SUBCOMMITTEE ON DIRECT FEDERAL SUPPORT OF RESEARCH AND DEVELOPMENT

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